AN ANALYSIS OF WHETHER MOZAMBIQUE CAN GAIN GREATER PARTICIPATION IN THE NATURAL GAS VALUE CHAIN

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ABSTRACT

The African continent possesses a wealth of natural mineral resources. Arguments have been put forward that these natural mineral resources can be one of the potential solutions to unlocking the challenge of underdevelopment and pervasive poverty in many African countries. Understanding how African countries can gain greater benefit from these mineral resources was the emphasis of this dissertation. Focus was placed specifically on the Mozambique natural gas sector. A case study methodology was employed with the purpose of determining whether Mozambique could gain greater participation in its natural gas value chain. Empirical and theoretical literature around mineral resources management including leading theories such as the resource curse were reviewed as key points of departure. A detailed analysis of historic natural gas projects executed in Mozambique, the legislative framework, contracts, and institutional and capacity demands then followed as a core part of the analysis. Finally, the study leaned on in-depth interviews with industry experts to understand the legal, policy, and technical barriers that could hinder Mozambique from gaining greater participation in the natural gas value chain. Key findings of the study pointed to the inadequacies of existing laws and contract provisions to deliver the vision of greater participation, barriers to entry such as high upfront capital requirements, and internal institutional and technical capacity gaps exemplified by the reliance on external technical assistance from partners such the World Bank. The study concluded that greater participation in the natural gas value chain could not be achieved through Mozambique legislating its way into upstream and midstream activities alone, rather, a progressive approach to gain greater participation was required, initially starting with increased participation in downstream activities through domestic gas to unlock industrialisation.

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ARAMCO	Arabian American Oil Company
ANRC	African Natural Resources Center
BBL	Barrel
BCF	Billion cubic feet per day
BCM	Billion cubic metre
BOE	Barrels of oil equivalent
BP	British Petroleum
CAPEX	Capital expenditure
CMH	Companhia Moçambicana de Hidrocarbonetos
CMG	Companhia Moçambicana de Gasoduto
CEF	Central Energy Fund
CCGT	Combined Cycle Gas Turbines
CNPC	China National Petroleum Corporation
EPCC	Exploration, Production Concession Contract
ENH	Empresa Nacional De Hidrocarbonetos
FSRU	Floating storage and regasification unit
FID	Final investment decision
FOB	Free on board
FLNG	Floating Liquified Natural Gas
GA	General Assembly
HH	Henry Hub
IOC	International Oil Company
INP	Instituto Nacional de Petróleo
IMF	International Monetary Fund
IBRD	International Bank for Reconstruction and Development
LNG	Liquified Natural Gas
MPE	Ministry of Petroleum and Energy
MMBTU	Million British Thermal Unit
MIREM	Ministry of Mineral resources and energy (Mozambique)
MMSCFD	Million standard cubic feet per day
NERSA	National energy regulator of South Africa

MIGA	Multilateral Investment and Guarantee Agency
NPD	Norwegian petroleum directorate
NOC	National Oil Company
NORAD	Norwegian Development Agency Corporation
OECD	Organisation for Economic Co-operation and Development
PSA	Petroleum Safety Authority
PPA	Petroleum Production Agreement
PETROMOC	Petróleos De Moçambique
PETRO-SA	The Petroleum Oil and Gas Corporation of South Africa
RTD	Retired
ROMPCO	Republic of Mozambique Pipeline Investments Company (Pty) Limited
SAOGA	Southern African Oil and Gas Association
SADC	Southern African Development Community
STATOIL	Norwegian State Oil company
SOCAL	Standard Oil Company of California
SPT	Sasol Pande Temane
TCF	Trillion cubic feet per day
UN	United Nations

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I would like to thank God the Father, the Son and the Holy Spirit, for through him, the conception, development and completion of not only this dissertation but this degree has been made possible. I would also like to thank the esteemed panel of all my teachers, starting with my supervisor, Professor Ian Goldman who has been my toughest critic, and yet my most enduring sculptor, pushing me to refine, improve, and make clearer the thoughts of my mind, the theories of my belief and ultimately the story which I sought to bring to the ears of many. I thank my other teachers who have molded me, class by class, throughout the journey of this degree and the contingent of the entire UCT support team. It is because of their support and commitment to this truly exceptional programme that this dissertation has completed its journey. Finally, I thank the foot soldiers in my family who know themselves oh too well, for having prayed for me, stood with me, guided me, held my hand, and kept my feet sturdy in the face of adversity, complexity, difficulty and ultimately triumph. And finally, to God Almighty through whom all things are possible, I say Glory be to the Father, and to the Son and to the Holy Spirit, as it was in the beginning, as it is now, and as it ever shall be, world without end, Amen

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The purpose of this study is to determine whether Mozambique can gain greater participation from its natural gas value chain.

Natural mineral resources present a significant opportunity for countries across Africa to create a potential avenue out of poverty towards an improved standard of living for the majority. Natural gas, in particular, holds significant potential as a bridge energy source between coal and renewable energy. As of 2018, at a global level, Africa accounted for 7,3% of total proven gas reserves (British Petroleum [BP], 2019). These significant reserves across Africa are underscored by current producers such as Algeria, Nigeria, Angola, Tanzania, Equatorial Guinea and Mozambique (Botes, Lane & Eginger, 2019). The case for what natural gas can do for the continent is indeed an exciting prospect. As an example, according to Smelcer (2019), the scale of power generation required to meet the African continents growing energy demands is well suited for gas-fired power as a bridge energy source which is cost-effective, relatively "green" and flexible. Countries such as Tanzania and Mozambique stand to benefit the most from potentially low-cost domestic gas which could potentially change the economic, industrial and social landscape of these countries.

This study is thus within the context of countries such as Mozambique which are on the brink of significant potential growth, supported by mineral resources developments but still entrapped in high levels of poverty, unemployment, and inequality. Countries similar to Mozambique that discovered significant mineral resources wealth have the opportunity to change the narrative from an aid-dependent people to that of a people on the rise. It is for this purpose that this research has been conducted, to aid such countries in capitalising on the opportunity presented by vast natural gas discoveries.

1.2 Background to the Study

Mozambique is located on the east coast of the African continent bordering Tanzania, Malawi and South Africa. Covering a surface area of 786,000 square kilometres, the country hosts a population of 29.5 million people, has an annual Gross Domestic Product (GDP) of USD 14,46 Billion, GDP per capita (current) of USD 498.9 and a GDP Growth rate of 3,3%

(World Bank, 2019). The Mozambican economy is structured around four key sectors: Agriculture, Industry, Manufacturing and Services, each consisting of 21%, 25%,11%, 46,6% as a percentage of GDP respectively. The industry sector principally includes mining, construction, electricity, water, and natural gas [which is the focus of this study] (Source, World Bank, 2019).USD 14,46 Billion, GDP per capita (current) of USD 498.9 and a GDP Growth rate of 3,3% (World Bank, 2019). The Mozambican economy is structured around four key sectors: Agriculture, Industry, Manufacturing and Services, each consisting of 21%, 25%,11%, 46,6% as a percentage of GDP respectively. The industry sector principally includes mining, construction, electricity, water, and natural gas [which is the focus of this study] (Source, World Bank, 2019). The natural gas sub-sector presents one of the most exciting opportunities for unparalleled growth in Mozambique. According to the International Monetary Fund [IMF] (2019), Mozambique could now possess what are argued to be potentially the third-largest natural gas finds in Africa after Nigeria and Algeria.

Estimations are that between 100-200 trillion cubic feet (TCF) of natural gas have been discovered off the shore of Mozambique's Rovuma basin in the Northern Cabo Delgado province by Anadarko[1] and ENI[2] (Standard Bank, 2019b). This is in addition to and in stark contrast to the mere 2-3 TCF of natural gas (proven) discovered in the Pande-Temane region of Mozambique which until recently was the only source of commercial production for natural gas in Mozambique (World Bank, 2003). The natural gas currently produced commercially from the Pande-Temane region is exported to South Africa while the recent discoveries of natural gas and the associated future commercial production have been contracted for export mostly to Asia when the first gas starts to flow post-2023. To put the scale of these discoveries into context, one need only consider that the 2-3 TCF of Pande-Temane natural gas, which currently exports an estimated 167 million gigajoules per annum (mGJ/a), has successfully supported a significant proportion of gas demand for large industrial and manufacturing businesses in South Africa, and is expected to continue up until 2023 (Human, 2019).

[1] All of Anadarko's Africa oil and gas assets were subsequently sold to Total in September 2019 (including the Area 1 Interest)

[22] Part of the ENI Stake (35,7%) was sold to Exxon Mobile in 2019. ENI and Exxon subsequently took up a joint role as operator of the Area 4 discovery.

With the new findings of between 100-200 TCF in the Rovuma basin of Mozambique, between five to ten times the current amount of commercial gas will be produced for export to predominately Asian markets as Liquid Natural Gas (LNG).

To further illustrate the scale of the potential, Standard Bank (2019) estimates that some of the largest projects in the world will be developed in Mozambique due to the significant natural gas finds. As an example, Capital Expenditure (CAPEX) estimated at USD 55 billion at the Afungi site in northern Mozambique for gas-related projects will potentially be the world's largest construction site after the Gorgon LNG project in Australia which had a total CAPEX value of USD54 billion. Furthermore, according to Smelcer (2019), Mozambique is well-positioned with recent discoveries to become the third-largest exporter of LNG behind Qatar and Australia. With the significant potential that exists to leverage the natural gas resource, this then begs the question, what benefit will Mozambique retain from its natural gas?

The purpose of this study is thus to explore whether Mozambique could gain greater participation from its natural gas value chain that consists of upstream, midstream and downstream activities. Also, greater participation of the host country encompassing the State, local private sector and local communities.

1.3 Problem Statement

Natural mineral resources have been extracted commercially on a large scale from the African continent for decades (Kabemba, 2017; Tunde-Oni, 2016; Shell, 2013). Since the first oil and gas resources were extracted for commercial gain in the early 1900s in Nigeria, Algeria and Libya, there is little progress in the development of concrete, sustainable and impactful solutions to how African countries can gain greater benefit from these mineral resources. There is an apparent perpetual dependency on development aid, donor funding and handouts even in mineral-rich nations. Countries continue to register mediocre development outcomes and, in some cases, regressive development outcomes notwithstanding the vast mineral resource wealth that some African nations possess (Billion, 2016). Countries such as Algeria, Sierra Leone and the Democratic Republic of Congo are cited by Billion (2016:18) as examples of countries that have fallen victim to these perils.

Countries across the continent have seemingly bought into the narrative that receipt of revenues from royalties and other mineral taxes from resource extraction is sufficient in exchange for allowing large multinational corporations to extract mineral resources from the African continent. The argument put forward by Massol and Estañol (2014) is that any government planner's portfolio that focuses only on mineral resources export revenue, taxes and royalties would be sub-optimal if the planner considered the variability and potential volatility of mineral resource export earnings to underpin the fiscus.

Countries across the continent seemingly continue to fight over what is effectively a smaller piece of the pie, relying on royalties and the little taxes afforded to them in exchange for mineral resources extraction rights by large multinational corporations. Panford (2017) argues that some African countries are embarking on what appears to be a competition, outbidding each other to offer multinationals concession contracts on extremely generous terms which do not deliver the greatest benefit for the majority of the population. Panford (2017) further argues that some analysts are erroneous in their assumptions that (in the case of his research) Ghana and indeed other mineral-rich African countries are impoverished and poor due to wastage and pilferage of large amounts of revenues. The argument Panford (2017) points to is that the size of the pie received is indeed smaller than most protagonists portray or imagine.

According to Beegle et al. (2016), more than ten of the most imbalanced countries in the world are found in Africa while citizens in resource-rich countries have worse outcomes in terms of human welfare indexes. Pashkov and Zumkeller (1996:4) further point out that 'no other region in the world makes so little use of its natural mineral wealth for the benefit of its peoples as Africa'. Botes, Lane and Eginger (2019: 2) also observe that oil and gas exports are the primary driver for economic growth in energy-exporting countries. However, oil can account for more than 90% of the revenue and the bulk of fiscal revenues, however, African energy exporters are struggling to fully harness this potential for sustainable economic development.

It can thus be argued that simply possessing a wealth of mineral resources is not enough to deliver a country from poverty and transition it to higher standards of living for all. The mere existent of this mineral resource wealth in the absence of clear frameworks and strategies to harness this potential is documented over the decades to, in fact, have a negative impact culminating in some cases into armed conflict in countries such as Nigeria (Udosen, 2009).

Indeed, a counter argument can be made that some African countries have received some notable developmental benefits from their mineral resources. A prime example being Botswana which has managed to establish a sovereign wealth fund titled the pula fund which has in previous times been utilised for developmental objectives such as providing universal primary education as well as at least three years universal secondary education among other developmental gains (ANRC, 2016). Notwithstanding positive stories from such as these, most other African countries' remain at a disadvantage in terms of their ability to adequately utilise their natural mineral resources for better development outcomes. With this in mind, the perplexing question then becomes why? Why is the African continent at a disadvantage when it comes to leveraging mineral resources for better development outcomes and local benefit, notwithstanding the plethora of mineral resources projects executed across the continent over the decades? Perhaps the answer may lie in a better understanding of mineral resources value chains. The broader central question then becomes, can Mozambique gain greater participation from its natural gas value chain?

1.4 Primary Research Objective

The primary objective of the study is to determine whether Mozambique can gain greater participation from its natural gas value chain.

Secondary research objectives included the following:

- To understand the history of Mozambique's participation in its natural gas value chain.
- To determine the legislative frameworks that are in place to help Mozambique achieve greater participation from its natural gas value chain.
- To determine concession contract provisions relevant to participation in the value chain.
- To determine barriers that hinder achievement of greater participation in the natural gas value chain.

1.5 Research Questions

- Which natural gas projects have been executed in Mozambique?
- What legislative frameworks are in place to underpin how Mozambique can achieve greater participation from the natural gas value chain?
- Which provisions have been used in the concession contracts to achieve greater participation in the natural value chain?
- What are the barriers that could hinder Mozambique from gaining greater benefit from its natural gas value chain?

1.6 Significance of the Study

A significant body of research exists detailing phenomena such as the resource curse and the Dutch disease concerning the paradox of high natural mineral resource wealth and utter abject poverty within communities where these resources are found (Priya, 2011; Billon, 2006; Auty 1995; Udosen, Etok & George, 2009). Most authors have pointed to matters of governance, political interference, strengthening fiscal regimes, the strength of State institutions, and over-dependence for income on a single mineral resource as some core explanations for this phenomenon.

Many authors have written extensively about mineral resources management, government, and development from the perspective of profitability, technological advancement to improve commercial viability, administration of public funds and corruption. Some arguments are encapsulated in research that sought to explain, challenge or complement resource curse narratives. There appears, however, to be limited literature regarding the narrative that explores greater participation of the host country in its mineral resources value chain. Specifically, the literature that adequately explores whether there is an argument that greater participation in the mineral resources value chain by a mineral-rich but economically poor country would yield greater benefit (country is defined not only as a government but broadly including other local private companies, local citizens and local development organisations, among others). Literature around resource-based industrialisation (Massol & Estañol (2014); Pashkov & Zumkeller (1996); Roemer 1976) attempts to cover elements of this argument but does not fully explore the entire value chain.

The massive gas discoveries in Mozambique are also recent, as such limited research exists for the specific circumstances and conditions of Mozambique. To illustrate this example, not until before the concession contracts were signed in 2006 for the Rovuma Area 1 and Area 4 gas blocks in northern Mozambique was there any anticipation that Mozambique could potentially become a formidable global supplier of Liquified Natural Gas - potentially the third-largest supplier in the world after Australia and Qatar (IMF, 2019). This research thus differs from other studies conducted in the area of mineral resources management and governance in terms of context and scale of resources found in Mozambique.

This study is also significant, particularly the selection of Mozambique as the case study in that it aims to complement existing knowledge that can empower Mozambique to avoid the pitfalls of under/mis-utilisation, or the "cheap give away" narrative of mineral resources that have befallen Nigeria, Ghana, Sierra Leone and the Democratic Republic of Congo as articulated by Panford (2017), Billion (2016) and Massol and Estañol (2014).

This study is also significant given for most African countries, and in this case, Mozambique, natural mineral resources are potentially the only significant avenue available to dig themselves out of underdevelopment, poverty and inequality. Priya (2011) concurs with this view articulating the need to better explain and understand how greater value can be extracted from mineral resources to aid mineral-rich but economically poor countries in Africa through her research on the Chad oil pipeline.

Finally, this study is significant as the intention is also to create a roadmap or blueprint that can potentially be transposed to other African countries that have recently discovered more oil and gas resources in Africa such as South Africa. It is evident that the forebearers in the oil and gas arena, which include Nigeria and Angola, have not adequately created a blueprint for how to gain greater benefit for the good of the majority. This study presents the opportunity to explore these possibilities using Mozambique a case study.

1.7 Outline of the Study

The remainder of the dissertation is set out as follows:

Chapter Two consists of the literature review and forms the basis of the analytical framework for the study. Chapter Three provides an analysis of historic Mozambique gas projects. Chapter Four presents the methodology. Chapter Five outlines the analysis and findings of the research. Chapter Six outlines the conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The following section provides a literature review of some of the key arguments and debates creating an analytical framework for this dissertation. The approach taken to conduct the literature review was to identify the literature that expounds upon the dynamics of gaining greater participation in the natural gas value chain as well as theories and arguments explaining why some mineral-rich countries fail to achieve more significant benefit from their mineral resources. Theoretical and empirical literature reviews were conducted. The theoretical literature examines the body of theory that exists in relation to a particular phenomenon, theories, concepts or issues (Saunders, Lewis & Thornhill, 2016). The empirical literature relates to the body of studies based on observations and events that have been experienced and can be studied or measured (ibid).

Within the scope of theoretical literature, core theories identified include the resource curse, Statist and societal theories. This literature was deemed significant in that it provided some insights as to why mineral-rich countries fail to attain greater benefit from their mineral resources as well as providing some insight into the proposals other authors have put forward to curb these challenges.

Following the theoretical literature review, an empirical literature review was conducted. In identifying potential focus areas for the empirical literature review, some guidance was sought from perspectives provided by other authors. Ronke (2014) as an example articulates that critical challenges impacting the participation of independent indigenous oil companies in countries such Nigeria across the value chain are an inadequate legislative framework to govern local content and local participation. Ronke (2014) also points out other material impediments to local players participating in the oil industry including limited local liquidity to finance long-term, large-scale exploration and development projects, limited technological capability and low/no credit ratings of local players. The empirical literature thus assessed key topics which cover legislation, financing, technology and participation. These themes were relevant to this study, given they provided some of the core underpinnings of how a State could potentially gain greater participation in the mineral resources value chain.

Finally, some literature was also reviewed concerning good practice considering how other States have managed to gain greater participation as well as the general legislative good practice at a global level.

2.2 Theoretical Literature Review

Economic Development

The concept of gaining greater value from the mineral resources value chain is centred (among other principles) around leveraging the mineral resources for greater economic development. The principle of economic development can be defined as being the consequence of long-term investments in the generation of infrastructure, new ideas, and knowledge transfer, which rely on functioning economic and social institutions and on cooperation between civil society, public and private sector (Feldman, Hadjimichael, Kemeny, Lanahan, 2014). Economic development involves the interaction between individuals, firms, organisations and nations based on their skills and resources to create value which is ultimately distributed across the population utilising certain criteria (Fagerberg and Srholec, 2017). Within this context of economic development, various ideas have attempted to explain why States fail or struggle to gain greater value from their mineral resources. These theories are utilised as a basis to explore the available literature to determine core themes later applied as the analytical framework for the dissertation.

Resource Curse Theory

The leading theory in the area of mineral resources management is the resource curse. The argument is that there is a negative relationship between increased economic development and high mineral resources wealth (Auty, 1993; Auty, 1995; Billon, 2006; Udosen, Etok & George, 2009; Priya, 2011). The theory articulates that the greater the mineral resource wealth possessed by a country, the lower the level of economic development experienced by that country. Ross (2015) provides some insights into how this mechanism may unfold. In the case of petroleum wealth, the significantly high amount of wealth may lead to effects such as elevated levels of corruption as many actors seek to benefit from the vast wealth. This, in some cases, results in inefficiency of resource allocation as policy decisions, contract awards and laws favour the few as a mechanism of distributing rents.

Secondly, countries with high mineral resource wealth tend to be plagued by war, in most cases, a civil war with the devastating effect of halting economic activity in war-torn areas and extensive social and economic costs to sustain the wars as well as to heal the wounds left in their path (Ross, 2015). Finally, at the heart of the resource curse theory are the negative effects of a stronger currency. In the first instance, the resource boom may result in an appreciation of the exchange rate which could negatively impact the competitiveness of other sectors internationally (Priya, 2011). Secondly, the resource boom can lead to domestic price inflation, increased imports, and a negative impact on demand in domestic sectors (Dobbs, R., Oppenheim, J., Kendall, A., Thompson, F., Bratt, M., and van der Marel, F, 2013). In this regard, one of the sectors typically affected in Africa is the agriculture sector while in the case of the natural gas boom in the Netherlands which gave way to the term "Dutch disease", the sector which suffered the most was manufacturing (Priya, 2011). All these elements are examples of how fertile grounds for dampened and, in some cases, regressive economic growth may be created.

Statist Theory

A second common narrative is what Ross (1999) classifies as Statist theory. This theory relates to concepts of poor State capability and its resultant negative impact on positive development outcomes. The argument put forward is that States that have inadequate institutional capacity and experience fail to maximise the benefit from their resources (agricultural, mineral or other capital resources), regardless of whether they have good well-articulated policies or not (Andrews, Pritchett & Woolcock, 2017; Balian & Shorjian, 2018).

Societal Theory

A third frequent narrative centres on societal theories as classified by Ross (1999). These include the influence of the privileged elite, interest groups, sectors and well-connected actors. These theories propose that a collection of a few elites that have access to, and control of resources, utilise them to distribute rents which allow them to maintain their power and influence at the expense of broader generation and sharing of economic wealth for the masses (Auty, 2006; Olken & Pande, 2012; Kabemba, 2017).

The theories mentioned above provide a general overview of existing ideas that attempt to explain why mineral-rich countries have been failing to gain greater benefit from their mineral resources. Their relevance is that they provide some perspective into what other authors have surmised when it comes to how mineral-rich countries can better manage mineral resources. In order to complement and add to these theories, this dissertation seeks to explore the concept of participation in the value chain as a potential entry point to gaining greater value from mineral resources wealth.

2.3 Empirical Literature Review

The following outlines the empirical literature review which principally covers resource curse narratives, participation in the value chain (structural and equity), ownership and legislative dynamics and financing dynamics.

Resource Curse Narratives

An extensive amount of literature exists on the phenomena commonly referred to as the resource curse. Billion (2006) conducted an extensive analysis of the resource curse characteristics, its effects, as well as identifying potential solutions to the scourge. The research revealed that on average, resource-rich nations had experienced lower economic growth over 30 years when compared to non-resource-rich nations.

One of the notable findings of the research was that bureaucrats controlling resource rents in resource-rich nations affected by the resource curse often exhibited high institutional inertia and conservatism, fighting to maintain the status quo. The study concluded that strong institutions and diversified economies in resource-rich nations prone to the resource curse were vital to avoid poor economic performance and governance failures which contrasted against the expectation of greater benefit from the mineral resources – what Billion (2006:27) termed a "resource bonanza".

Auty (2006) supported Billion's (2006) assertions about the negative impact of high rent-seeking behaviour on the ability of a State to gain greater value from its mineral resources. Research by Auty (2006) on mineral resource management aimed to provide an economic perspective to explain the peculiarities of how mineral rents are managed, in some cases resulting in different development outcomes. Auty (2006) argued that there are two key models of resource-driven development – a "low rent industrialisation driven model" and a "high rent staple trap model".

Auty (2006: 629) stipulates that the low rent model encourages countries to promote wealth creation and encourage early competitive industrialisation while countries caught in the high rent staple trap model were prone to deflecting incentives for wealth creation and industrialisation replacing these with rent redistribution providing higher and more immediate rewards on the political front. Findings from the study pointed to three distinct characteristics exhibited by Indonesia and Malaysia which aided them in avoiding severe impacts of the resource curse. These were sound macroeconomic management, control of rent-seeking behaviour and notable efforts to raise the standard of living of the rural poor through infrastructure and agricultural mechanisation. The study concluded by highlighting that alignment with initiatives such as the Extractive Industries Transparency Initiative (EITI) could also play a crucial role in reducing negative mineral resource rent-seeking behaviour.

Another important narrative put forward by authors as having a significant impact on a country's ability to gain higher value from its mineral resources is the concept of State capability and capacity. Priya (2011) conducted research that shed some light on this phenomenon based on a qualitative case study of the Chad-Cameroon oil and gas pipeline. The study assessed the inverse relationship between the extensive dependence on mineral resources and poor economic development. It concluded that the main approaches to the mitigating effects of the resource curse should include consideration of the political situation in the host country prior to embarking on an oil and gas project to lessen political risk, as well as ensure a certain level of host country institutional capacity as a prerequisite for maximum benefit from the project.

The arguments posed by Priya (2011) relating to State capability and institutional capacity are also supported by Ross (2018) who stipulated that a consensus was emerging regarding the mediating effect of institutional quality in moulding the relationship between mineral-rich nations and their associated development outcomes. The study conducted by Ross (2018) utilised the analytic narrative approach to explain the variance in outcomes between two oil- and gas-rich nations (Angola and Nigeria) in terms of projects executed – Nigeria having succeeded, and Angola having failed.

Results from the study revealed that variance in State institutional quality and effects of an authoritarian regime partially contributed to the different commitment and credibility positions between Angola and Nigeria for the successful implementation of oil and gas projects. The study concluded that the different political settlements and political economy trajectories helped explain the differing outcomes between Nigeria and Angola.

Linked to the theme of State capability is the narrative of mineral resource mismanagement. Research conducted by Udosen, Etok and George (2009) investigated the "paradox of plenty" in the oil and gas sector, using Nigeria as a case study. Udosen et al. (2009) argued that nations with significant mineral resources reserves should be at the forefront of prosperity, but they found themselves significantly disadvantaged in their drive for economic development, notwithstanding the resource wealth they possessed. Results from their research showed that although oil wealth in Nigeria was initially channelled to the development of the country, successive mismanagement by the government led to political instability, rampant corruption, and militancy in the Niger delta.

In contrast to the views which support the resource curse narrative and its various mechanisms of manifestation, an alternative analysis is provided by Panford (2017) that investigated whether phenomena such as the resource curse could explain the outcomes of the oil and gas developments in Ghana. The research investigated various arguments by other authors for and against the resource curse. It drew parallels to other major events and theories such as the cold war, neo-colonialism and neoliberal economics to help provide an alternative explanation to the resource curse for Ghana's experience with oil and gas. The findings of the research pointed to the need for a more contextual proposition of arguments to explain the paradox of plenty, indicating inadequately framed use of common narratives such as corruption and squandering of revenues. The study concluded that there was a need for some areas and activities to be prioritised to better prepare for, and speed up socio-economic development, leveraging oil and gas. Key areas cited included deal negotiations, education, skills development, value addition through industrialisation, local content, finance, and legislation.

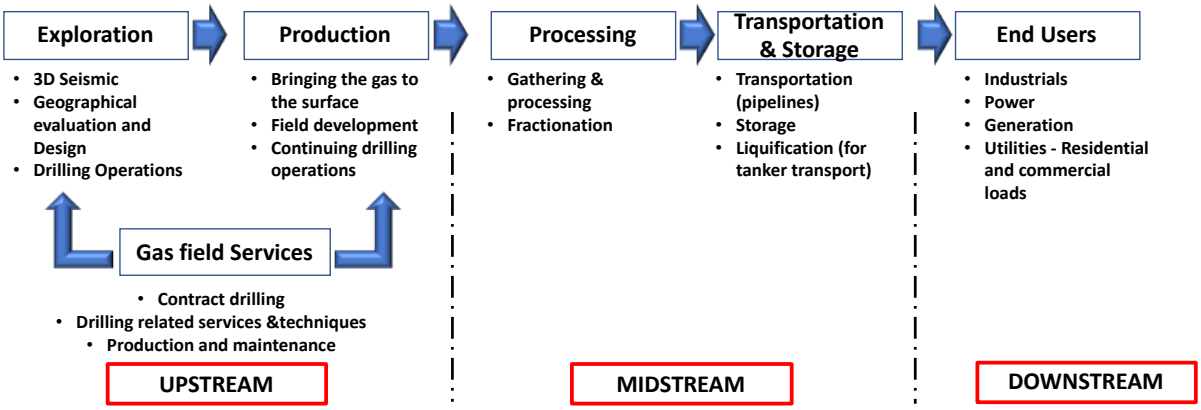
Similar to the contrasting views of Panford (2017), Boschini, Pettersson & Roine (2012) also challenge the resource curse narrative, arguing that notwithstanding the empirical evidence that shows a negative relationship between resource-rich countries and the corresponding GDP growth, there are also notable exceptions where resource-rich countries have seen positive growth. In particular, countries such as Botswana, Australia and Norway (Boschini, Pettersson & Roine, 2012).

The above literature clearly outlines some of the mainstream theories regarding why countries fail to gain greater benefit from their mineral resources, and potential solutions to increase this benefit by way of mitigating effects of the resource curse. Some of the key learnings from these theories are around the mechanisms through which the resource curse phenomenon propagates, such as high rent-seeking behaviour and deflecting incentives for wealth creation in favour of immediate political gains. The success stories are also evident from the literature, suggesting that leadership regimes with characteristics that are non-authoritarian possessing institutional quality, good governance, and capacity present a case for potentially better outcomes in terms of gaining greater value from mineral resources wealth. This dissertation thus seeks to add to these theories, by investigating the role that the greater participation of Mozambique in the value chain could play in potentially mitigating effects of the resource curse and increasing the benefit of Mozambique from its mineral resources.

Participation in the Value Chain

There is no universal definition of what constitutes participation in the mineral resources value chain. From a technical perspective, the first level of participation is the equity stake (participatory interest) a country can have in a natural gas concession which accordingly may provide it with access to upstream, midstream and downstream rights and obligations. The second level of participation can be from a structural perspective that falls outside of the concession agreements. This structural element may speak to the level of involvement of the government in utilising and integrating the natural gas resource into the industrial activity and economy either at upstream, midstream or downstream stage.

Figure 2.1: Natural gas value chain



Source: Saoga, 2019.

Structural Participation through Industrialisation

In relation to gaining greater value from mineral resources from a structural value chain perspective, Roemer (1976) conducted quantitative research aimed at demonstrating the potential contribution of resource-based industrialisation to efficient growth, employment, equality and economic independence in resource-rich developing countries. Key findings from the study revealed that host countries enjoyed comparative advantage for export of industrial processed goods for resources such as copper, bauxite, aluminium and timber due to factors such as reduced weight and transport costs and value addition. Cheap natural gas was, in particular, noted as a crucial contributor to making the export of refined iron ore and steel competitive on a global scale. The research found that contributions from resource-based industries to employment and correspondingly equality were minimal due to the capital-intensive nature of resource industries and high barriers to entry from multinationals. Roemer (1976) concluded that further research is essential given the limited information available on strategies for resource-based industrialisation.

In contrast to Roemer (1976), a study by Pashkov and Zumkeller (1996) observed some benefits from resource-based industries seeking to gain greater value from the mineral resources. Pashkov and Zumkeller (1996) conducted a quantitative analysis of the gap between the production and utilisation of mineral resources and energy in Africa. The objective was to develop policy scenarios for how Africa could better utilise its resources at a domestic level through increased industrialisation.

Findings from the analysis indicated vast underconsumption of raw mineral resources on a domestic level on the African continent compared to production. The research also revealed that Africa failed to value its resources adequately and, in a sense, gave them away too cheaply in raw form. This observation, when combined with low levels of productive assets acquisition, was noted to have led to the underutilised human capital, pervasive poverty and degradation of political and social structures. The study concluded that there was a need to expand the actors involved in mineral resources value chains to include local communities and local private companies which could deliver a multiplier effect on industrial development.

Massol and Estañol (2014) concurred however with the analysis conducted by Roemer (1976) to some extent. Their quantitative empirical research aimed to develop a methodology to assess the performance of resource-based export diversification strategies using the Mean-Variance Portfolio (MVP) approach. The key natural gas resource-based industries assessed included LNG export, metal processing industries such as aluminium smelting, steel and iron production, gas to liquids (GTL) industries producing fuels such as diesel or methanol and fertilizer industries producing urea. Findings indicated that diversification away from the export of raw resources to export based on resource processing industries was not necessarily a solution. The study also found that some countries would benefit by modifying their resource monetisation strategies. Finally, the study found that the relevance of some gas-based industries is questionable, in that they provided a lower benefit compared to that from raw export of natural gas as LNG as an example.

Equity Participation

Ellis (2015) conducted some research into the level of participation of the South African State in the oil and gas sector. The analysis conducted by Ellis aimed to understand the potential impact of proposals to increase State participation on critical matters such as investment in the upstream oil and gas sector which focuses on exploration activities. One of the main components of the proposal was an increase in the free carry participation component for South Africa (See Box 1 for details of the free carry concept).

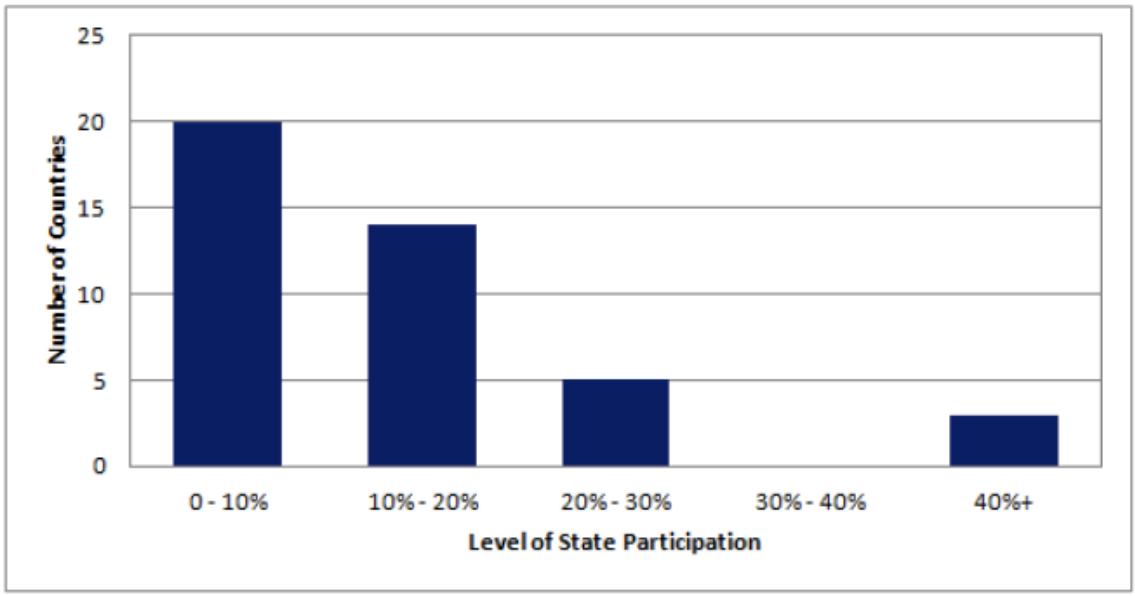
Box 1: Free Carry Participating Interest

A key concept that requires some broader elaboration regarding participation is the free carry interest concept. Breeding (1963) explains that the co-owner of a development that agrees to carry the interest is the carrier, or the carrying party and the co-owner for whom costs are advanced is the carried party. Villarreal (2013:1) elaborates that this means the other parties would effectively "carry" the costs of the carried party "paying all or part of his or her share of the costs involved in the development prospect". Ellis (2015) further confirms that a free carry can range from costs carried for the natural gas exploration phase (exploration carry) to costs carried for all exploration and production expenditure (complete carry). Due to the significant cost of acquiring working interest in the resources developments some countries typically negotiate a free carry interest, this means that their share of costs associated with the development of the natural gas resource is paid for by the other parties to the development (typically international developers). The implication of holding a free carry interest in relation to adequate participation is a key theme this dissertation analyses in later chapters as arguments will be made about the ability of stakeholders with a controlling stake to gain greater benefit.

Findings from the study partially provided some perspectives on the landscape of participation from the viewpoint of equity in concessions (participatory interest).

As illustrated in Figure 2.2, across Africa, most countries have participatory interests in concession contracts of up to 10% or less on average, while there are a few cases such as Algeria where the participatory interest is as high as 40%. The study noted, however, that the countries with high participatory interests had well-established oil and gas sectors which reflected the level of negotiating power of the State in obtaining such a high stake.

Figure 2.2: Levels of grouped State participation in concession contracts in Africa



Source: Ellis (2015).

Research by Ellis (2015) also revealed that the proposals by South Africa to exercise greater participation in its natural gas value chain seemed to create uncertainty with investors, resulting in them reconsidering their capital plans pending further clarification of the legislation. Ellis (2015) concluded that the proposed high increases in State participation through amendments to the legislation would likely cause a decline in investment within the upstream oil and gas sector in South Africa. In alignment with the views by Ellis (2015), Bowmans (2013) asserted that the potential shareholding in gas projects proposed by South Africa was so high as to create a disincentive for international oil companies to invest. Kabemba (2017:3) classifies this phenomenon of concerns regarding local players having too large an equity stake as "over incentivisation to attract foreign direct investment". He argues that in some cases, the exemptions and relaxed regulations lead to deteriorating profits and arguably lower participation for host African governments in the value chain.

Ownership and Legislative Dynamics

The concept of mineral resource ownership and associated legislation is relevant to this dissertation in that it provides some insights into key elements of control, distribution of rents and ultimately the level of benefit that can be garnered by the de facto "owner". Furthermore, the level of participation in the natural gas value chain (which this dissertation expounds upon in later chapters) itself is embedded, and to an extent, aligned with the ownership dynamics. The definition itself of what constitutes ownership is variable. However, the following literature provides some insights into how ownership is defined across various countries in the oil and gas sectors.

According to one of the concession contracts for natural gas projects executed in Mozambique, up until the resource has been extracted from the ground and reaches the "wellhead[3]" where the resource emerges from the ground – it remains the sole property of the State, but it effectively has no commercial value. Once the resource exits the ground, sole ownership transfers from the State to the Concessionaire (which in the case of Mozambique includes the State). Clause 20 of the Anadarko Area 1 Contract, (2006:70) stipulates the following:

[3] "Wellhead" means the inlet flange of the first valve after the wellhead production manifold. Source: Anadarko Area 1 Contract, 2006:10

> *Title to the Concessionaire's entitlement of Petroleum Produced under this Exploration & Production Contract (EPC) shall pass to the Concessionaire at the Wellhead. Thereafter the Government and the Concessionaire shall own the Petroleum jointly, and in undivided shares, until each takes individual title to and delivery of its entitlement of Petroleum at the Delivery Point*[4].

Standard Bank has conducted extensive research into the natural gas developments in Mozambique focusing on providing an independent macroeconomic assessment of the impact that the natural gas discoveries in northern Mozambique could potentially have on the Mozambican economy.

One of the notable assertions made by Standard Bank (2019b:26) is where it points out that "The government of Mozambique does not own the gas". Standard Bank (2019b:26) goes on to explain that "the gas is owned by the concession for the EPC term". The inference from Standard Bank (2019b) here refers to the level of control and decision making with which the "real owner" retains either in terms of whom to sell the gas to, or how much gas can be retained/utilised in the domestic economy of Mozambique. Both are elements over which Mozambique notably had little control, and thus speaks to the question of the necessity for greater access and participation on the part of Mozambique.

In the case of Libya, the American Central Intelligence Agency (CIA, 1986) holds the view that the Libyan government was heavily dependent on foreign oil companies for operating and maintaining its oil industry. In subsequent periods, however, the oil major Shell (2013) points out that in 1970, the Libyan government decided to take control of the oil and gas resource which had for a period been operated and exploited by foreign companies. Key elements of the reforms included nationalisation of distribution activities and implementation of rule 66, which limited foreign company shareholding in production to 49%, giving the Libyan government 51% (Shell, 2013).

[4] "Delivery Point" means in the case of Natural Gas the inlet flange of the transmission pipeline. Source: Anadarko Area 1 Contract, 2006:8

Finally, developments in Nigeria also provide some relevant context to ownership and legislation in the sector. According to Onuegbu (2016), it was only in 1956 that Shell-BP found oil in Oliobiri, Nigeria. Due to the colonial influence, legislation to start improved taxation of the oil and gas industry only occurred between 1961-1990, when the government of Nigeria introduced its first regulations in which profits would be shared equally between the government of Nigeria and international oil companies. Onuegbu (2016) suggests that it was also in the post-1960 period that the level of participation of the Nigerian government in the industry started to shift from merely being a regulator and collector of royalties and taxes to the owner. The history of developments in Nigeria points to a noteworthy evolution of dynamics regarding ownership and control of the natural oil and gas resources. The observation made by Onuegbu (2016) regarding a transition from being a mere royalty collector to becoming an "owner" is particularly striking.

Kabemba (2017) also provides views aligning with the trajectory taken by Nigeria arguing that while the renegotiation of mineral resources contracts for more significant benefit is appropriate as a corrective measure, laws must be changed on moral and rights-based grounds to improve the benefits to the host African country. Kabemba (2017) further articulates that African countries need to increase their ownership of assets producing mineral resources stating that whoever controls the resource has substantial power to control revenue sharing and benefits. Pashkov and Zumkeller (1996) concur, stipulating that "It is a core right of citizens to control their country's national natural resources".

In alignment with the views put forward by Kabemba (2017), Pashkov and Zumkeller (1996), a study was conducted by Ronke (2014) that examined the levels of participation of indigenous oil companies in Nigeria. The study sought to determine the challenges faced by these indigenous companies for the execution of oil and gas projects. One of the key challenges impacting their participation in Nigeria across the value chain were inadequate legislative frameworks to govern local content and local participation. Findings by Ronke (2014) indicated that until the 1970s, the international companies controlled the oil and gas resources by way of concessions with the obligation to only pay some sums of money as royalties to the Nigerian government.

Ronke (2014) continues, however, that after the 1970s, Nigeria's participatory approach to the oil and gas industry altered to start including participation in joint venture and production sharing agreements which meant greater involvement of the host country in other parts of the value chain. Ronke (2014:8) concluded that one of the solutions to the lack of adequate participation was the licensing of marginal fields to local players and enactment of new legislation – "the Nigerian Oil and Gas Industry Content Development Act of 2010".

In contrast to Ronke (2015), a study by Oluwasanmi (2018) contends that progress is slow in creating the appropriate legislative frameworks to address issues such as technology transfer. Research by Oluwasanmi (2018) assessed participation in the oil and gas value chain through the lens of technology. It analysed issues of technology transfer in relation to entrepreneurial development. The study found that that countries such as Nigeria had indeed made some efforts to increase indigenous participation through various local content, indigenous participation and marginal field development policies. The study noted, however, that despite these efforts, the oil and gas value chain remained predominantly controlled by multinationals in Nigeria. One of the key factors cited was the advanced technological capability of multinationals and the lack thereof on the part of Nigerian companies.
The study concluded that the investigation of technology transfer mechanisms was an essential starting point to improve access and participation of local players in the oil and gas industry.

Financing Dynamics

The final theme noted in the literature review is the financing of oil and gas projects in Africa. The importance is underscored by assertions made by Ronke (2014) articulating that material impediments to local players in Africa participating in the oil industry include limited local liquidity to finance long-term, large-scale exploration and development projects and low/no credit ratings of local players.

In addition to the impediments noted by Ronke (2014), Simelane and Mohamed (2012) suggest that governments in Africa have traditionally financed infrastructure projects with public funds (on the government's balance sheet). However, these funds are significantly limited.

Temitope (2013) argues for an alternative approach, specifying that taking infrastructure finance off the government balance sheet through structures such as Build Operate Transfer concessions creates a mutually beneficial scenario for both government and private investors. However, notwithstanding the notion put forward regarding off-balance-sheet financing, Simelane and Mohamed (2012) contend that those African countries are plagued with limited access to domestic and international capital markets and low credit ratings leading to dependency on international investors (Simelane and Mohamed, 2012). The assertions made by Simelane and Mohamed (2012) contrast with the Korean model as an example, where investment in the development of the LNG industry was government-led, given Korea's ability to access international capital markets to borrow (ANRC, 2017).

Simelane and Mohamed (2012) elaborate on some options for avenues to improve liquidity for infrastructure investment including "cost-reducing technology, using syndicated loans, expanding pension funds and project bonds, increasing partial risk guarantees, using indexing for foreign currency risk and the project finance approach", among others.
Expanding on the project finance method presented by Simelane and Mohamed (2012), research by Ronke (2014) identified project finance as a key approach used for large-scale oil and gas projects. Ronke (2014) states that over the years, the concept of project finance emerged as one of the core mechanisms for financing projects in Africa. Ronke (2014) asserts that project finance developed over the years as a vehicle to pool funds from a range of investors typically consisting of debt, equity, credit enhancers and political risk cover to provide finance for projects typically with a high cost of capital, long tenure and a high-risk profile.

Dornel (2014: 4) supports Ronke (2014) defining project finance as "structured long-term financing of infrastructure, industrial, and public services projects with limited recourse to the sponsors, where project debt is repaid from future cash flow generated by the project once operational". Some key features of project finance transactions relevant to natural gas projects include the high cost of capital, high leverage, non-recourse or limited recourse financing, long tenure and high risk (Dornel, 2014). Further to the picture painted by Dornel (2014), Hoffman (1998) provides some historical context stating that project financing as observed today started as early as the 1970s due to the increasing inability of governments to continue financing infrastructure with exponentially increasing capital requirements, risk

and tenure. The characteristics described by Hoffman, aptly explain the financial scale and complexity of large-scale oil and gas projects on the African continent today.

Finally, an alternative approach to financing oil and gas projects (and indeed other projects) in Africa has been the resource-backed financing approach. Resource-backed financing refers to what is commonly described as low interest or "free" loans, but in reality, they are typically inflated transactions that amount to infrastructure investments in exchange for mineral resources Deloitte (2019). The material attraction to Chinese loans is significantly low-interest rates and long tenures often spanning over 15 years (ibid).

Ross (2018) articulates that some of the first large "oil-for-infrastructure" deals on the continent took place in Angola with the Chinese for oil and gas. Vines (2010) supports the assertions made by Ross articulating that by 2009, China had facilitated infrastructure loans of up to USD 13,4 billion and in exchange, they received oil equity in key oil and gas exploration deep-water blocks.
The Deloitte (2019) analysis makes the point, however, that the Chinese resource-backed funding model has come under some scrutiny because it reinforces the resource curse.

Conclusion

The central observations from the theoretical and empirical literature point to a history of African governments relying on foreign companies to conduct exploration and development activities, mostly due to the significant amount of capital and technological advancement required to develop commercially viable projects. These themes are central issues in the narrative of participatory dynamics in the mineral resources value chains. The African Natural Resources Centre (ANRC, 2017), argues that few African governments are in a position to borrow and finance the scale of natural gas projects in the manner done by countries such as Korea. As a result, they end up leaning on international investors through project finance transactions and more recently, through resource-backed loans.

The overall thread observed from the snapshot literature review is that the key pillars include participatory interest, legislation, high financial capital requirements and advanced technology requirements. The primary question then becomes: how have various actors across the value chain interacted or influenced the abovementioned key pillars to steer or determine participatory dynamics within the natural gas industry in Mozambique?

2.4 Literature Review of Global Good Practice

The Case for Natural Gas

Globally, natural gas is increasingly being integrated by countries as a key component of industrial policy and development for a number of reasons. In the first instance, natural gas has la ower carbon footprint of up to 50 percent fewer emissions than coal per unit of electricity generated and 33 percent fewer emissions than coal per unit of heat generated[5] (IEA, 2019b). Natural gas also acts as a suitable transitionary fuel from coal to renewables by plugging the gap of intermittent[6] renewable power (Smelcer, 2019).

Natural gas also comes at a lower cost per oil barrel equivalent compared to diesel, however, it is still more expensive than coal-based on current technologies (IEA, 2019b). And finally, natural gas is about 39 percent more efficient than the oldest 50 percent of existing coal generation capacity, and in the case of the oldest coal-fired power plants, up to 60 percent more coal is required to generate the same unit of energy produced when compared to natural gas (IGU, 2020).

Applications of Natural Gas

In terms of end-user applications, countries such as Tanzania, Nigeria, and South Africa among others have utilised natural gas on the African continent for key developmental applications. These applications include gas to power projects (*electricity*), gas to industry (*including the manufacture of Urea/fertiliser and various gas to liquids applications such as diesel and chemicals*) and gas to residential applications such as liquid petroleum gas (LPG). South Africa as an example through the Sasol operations produces fertilizers for the agricultural market and liquid fuels for transport applications using natural gas (Sasol, 2020).

[5] Note: methane leaks must be managed to gain the full carbon footprint reduction benefits (IEA, 2019b).

[6] The good transitionary fuel attributes of natural gas are still relevant considering that energy storage technologies are still evolving (Smelcer, 2019).

In the south-eastern part of South Africa, Petro-SA through its the Mossel bay Gas to Liquids (GTL) refinery produces a series of liquid fuels and synthetic chemicals using a unique GTL Fischer Tröpsch technology (Petro-SA[7], 2020). In Nigeria, gas has been utilised through organisations such as Shell Nigeria mostly for industrial customers. Key uses include gas as a feedstock for fertilizer and methanol production, industrial processes such as space heating, raising steam boilers and furnace operations as well as transportation applications through compressed natural gas (CNG) for vehicles that utilise CNG as the motive power fuel source (Shell Nigeria, 2020). In Tanzania, natural gas is currently being utilised for various gas to power projects fuelled by Songo Songo and Mnazi bay gas totaling some 423.5 MW in generation capacity. Processing plants at Songo Songo and Mnazi bay also feed a range of industries with gas feedstock for steel smelting applications, cement industries, fertilizer, and other chemical industries (Msaky, 2015).

International Oil and Gas Law

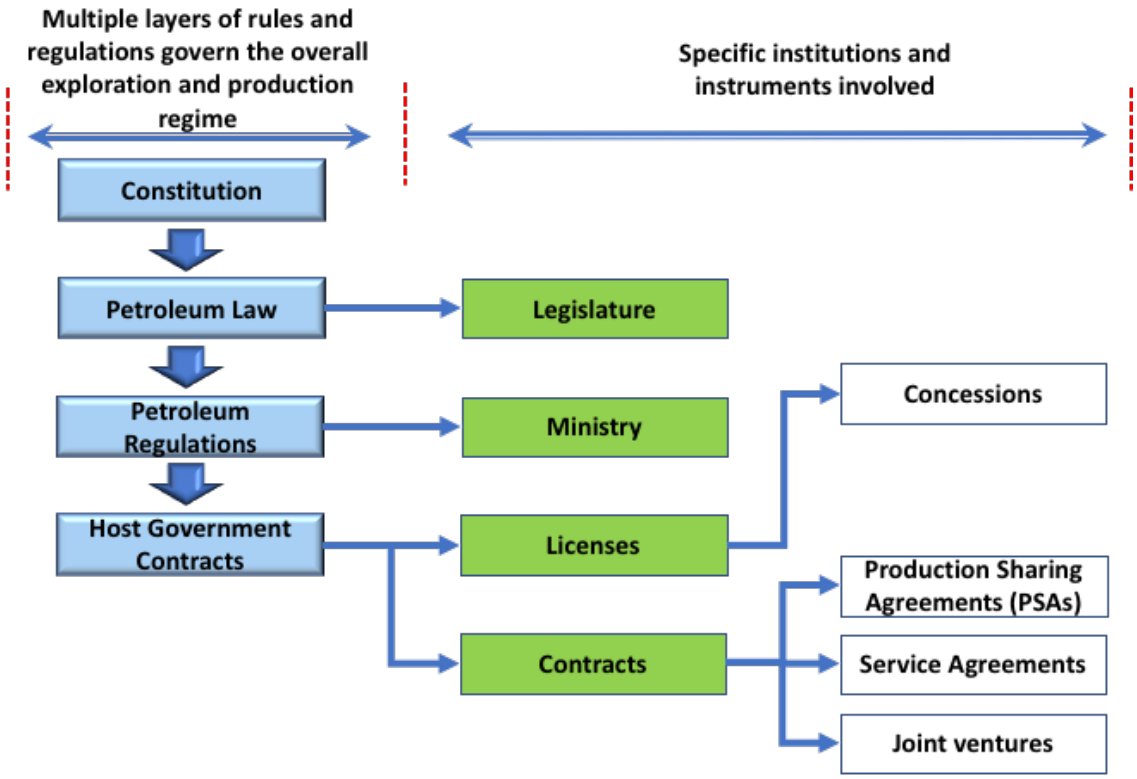
A range of laws collectively forms the body of law, commonly known as International Oil and Gas Law. This includes the 1958 Convention of the Continental Shelf which recognises a States sovereignty over its natural resources, United Nations (UN) General Assembly (GA) Resolution 1803 on Permanent Sovereignty over Natural Resources of 1962, and UN GA Charter of Economic Rights and Duties of States of 1974 and UN Resolution No. 626 (VII) on the right to freely exploit natural wealth. The UN resolutions accordingly afforded States the opportunity to fully utilise natural mineral resources for the benefit of the host country. Further provisions commonly adopted as international oil and gas standards are contained in legal documents such as the Energy Charter of 1994. This charter was originally signed between the then newly emerging former Soviet Union States of resource-rich Central Asia and Europe, as well as Japan, Russia and Turkey. Other countries such as Kenya have recently started to also sign up to this charter (Extractives hub, 2019).

[7] Petro-SA: The Petroleum Oil and Gas Corporation of South Africa

Oil and Gas Regulatory Frameworks

Further to the aforementioned international prescripts, national-level laws governing oil and gas typically stem from the constitution of the host country, with specific oil and gas regulations espoused in the petroleum law (Boston Consulting Group [BCG], 2012). Figure 2.3 below provides an overview of the generally accepted legal frameworks within which oil and gas resources are exploited globally.

Figure 2.3: Oil and gas regulatory framework



Source: BCG, 2012

The accepted principles for good practice in the oil and gas sector were noted to usually cover matters such as methods of contracting, types of legislative frameworks, frameworks for petroleum taxation and environmental protection prescripts (Leuch, 2012). As illustrated in figure 2.3 above, countries typically enter into either concession contracts, production sharing contracts, service agreements, or joint ventures.

Concessions

Concessions usually involve the host country granting rights to conduct certain activities on an exclusive or collaborative basis (Ernst & Young [EY], 2019). These activities could include exploration, production, or infrastructure development for the oil and gas resource. A key feature of this arrangement is that the concessionaire receives ownership of the oil and gas produced, which it may produce at its own risk and market freely at its own expense. Ownership typically transfers to the oil and gas company at the wellhead once the gas has been extracted (BCG, 2012). Depending on the provisions of the concession, the host country is compensated through various fiscal instruments which are discussed in the latter part of this section.

Production Sharing Agreements

Production sharing agreements involve the host country entering into a direct agreement with an oil and gas company. The oil and gas company conducts the upstream exploration and production activities and receives a certain proportion of the natural gas resource to recover its costs as well as a proportion of the profits from the sale of the natural gas (EY, 2019). A key distinguishing feature of this contract is that ownership of the gas produced is typically shared between the host country and the oil and gas company as per the contract provisions (BCG, 2012). This type of contract may also require the oil and gas company to compensate the host country through additional fiscal instruments.

Services Contracts

In the case of a services contract, the host country retains ownership of the resource, enters into an agreement with an oil and gas company to produce the oil for which a service fee is paid in addition to certain allowances to recover production costs. (EY, 2019). In this arrangement, the oil and gas company carries no risk or cost of exploration (BCG, 2012).

Joint Ventures

Finally, a joint venture (JV) approach is utilised in cases where the host country's national hydrocarbons company has the original right to conduct the exploration and production activities. In this arrangement, the host country actively participates in the financing and production activities of the resource as per the JV agreement.

In practice, governments may enter into various forms of the above-mentioned contracts with hybrid elements of one or the other. Key elements considered in making these decisions include the level of risk transfer for the development of the resource, ownership of gas produced, level of participation in operations, political stability, market maturity, and strategic developmental or commercial decisions taken by the host country (EY, 2019).

Oil and Gas Fiscal Instruments

In terms of financial benefits to the host country, depending on the specific provisions of the agreements, the host country is typically compensated through various fiscal instruments such as royalties, corporate income tax, production bonuses, windfall /extraordinary profit, tax and export duties. Use of the above fiscal instruments varies per country depending on the quality and volume of the resource found, complexity/ease of extracting the resource, and the negotiating power of the host country compared to the prospective oil and gas company. (United Nations, 2017).

Taxes, Royalties, and Bonuses

Profit taxes may come in the form of corporate income tax, windfall tax, or extraordinary profit taxes. Royalties, on the other hand, are generally calculated (in hard currency or molecules) as a proportion of the volume produced or the anticipated volume. Royalties are typically not calculated on the profit. Royalties may be considered as the purchase price or the natural oil and gas resource or the entitlement of the incumbent oil and gas company to ownership and sale of the resource produced (United Nations, 2017). Bonuses are often paid as fixed amounts for a particular event such as signature of the contract or commencement of production. Bonuses are useful instruments for host countries as they provide early income. Bonuses are also not calculated on the profits (United Nations, 2017).

It was noted however that realisation of some of these fiscal benefits could depend on the dynamics of whether participatory interest (equity) has been paid up or if the aforementioned financial benefits will initially be utilised to pay off the resource owner's equity stake.

Simply put, if the host country has not yet paid off its equity contribution, any compensation received from the oil and gas company will likely be utilised to pay off this debt as a first step (BCG, 2012). Table 2.1 below provides a summary of common fiscal instruments utilised globally.

Table 2.1 Common fiscal instruments utilised to benefit the host country financially

Stage of Resource Development	Fiscal Instrument	Instrument Characteristics
Contract onset/signature	Signature Bonus	Fixed amount which may be calculated as a percentage of expected future income or resource value
Research and Exploration	Exploration Bonus	Similar to signature bonus characteristics
Extraction, production and export	Royalties	Payment on the value of the resource or proportion of the volume produced
	Production sharing	Proportion of production paid to the host country
	Profit taxes/Windfall taxes	Taxes levied on income/profits generated for resource sales
	Export duties	Taxes levied on export of the resources
Decommissioning and abandonment	Environmental penalties/fees	Taxes levied for pollution /externalities caused

Source: United Nations, 2017

Fiscal Instrument Peculiarities: Norway, Germany, Denmark Experience

It was noted however that countries also enact and abolish certain specific legal provisions and fiscal instruments depending on their level of development, market maturity, resource ownership, fiscal requirements, and strategic national objectives. As an example, Norway as one of the leading oil and gas producers in the world abolished royalties on natural gas in the early 1990s (Leeberg, & Bernsten, 2019). The United Kingdom (U.K], Germany and Denmark likewise employ a fiscal regime which principally consists of corporate income taxes and special oil taxes and does not utilise royalties as part of its fiscal regime (BCG, 2012).

Royalties typically impose an additional cost linked to revenues or production and not necessarily the size of the oil and gas fields or the development costs. Countries such as Norway and the U.K have thus abolished royalties in order to make it more economical to produce oil and gas from some of the smaller marginalised discoveries without the burden of royalties (bid). The manner in which countries enact or abolish certain legal prescripts for the oil and gas sector also in part reflects the level of development and market maturity within these jurisdictions in relation to ownership and control, where countries such as Norway own the majority of their oil and gas resources and would thus have a lower dependency on royalties compared to other developing African countries.

Regional and International Perspectives on State Participation

In terms of State participation, some insights into how other State-Owned Entities (SOEs) have gained better participation in the value chain illustrate the potential trajectories Mozambique could take.

The Botswana Experience

From a regional perspective, some lessons can be gleaned from countries such as Botswana. Although the context is marginally different, Botswana is as one of the regional economies that has managed to make progress in escaping trappings of the resource curse through appropriate governance and policy choices to utilise its mineral resource wealth (ANRC, 2016). Although more still needs to be done by Botswana, it has made use of good institutional designs and appropriate fiscal and macroeconomic policies to gain developmental benefit from its mineral resources (diamonds).

As defined further below, Initiatives such as the establishment of a sovereign wealth fund, use of principles such as the Sustainability Budget (SBI) rule and the Hartwick-Solow rule, of thumb have proved beneficial in managing the country's mineral resources wealth.

In terms of good fiscal policy, the government of Botswana took the approach which ensured that recurrent[8] government spending was only financed with non-mineral resource revenues. Mineral resource revenues, on the other hand, were noted to either be saved in the State's sovereign wealth fund or they were used to finance non-recurrent expenditure[9] (Columbia University, 2013). It was noted however that mineral revenues were in some cases called upon to plug any shortfalls in the recurrent expenditure, but this was done in accordance with the SBI rule. SBI determines the ratio of recurrent expenditure to non-mineral revenues. In years were the SBI was greater than one, mineral revenues were called upon to plug the recurrent expenditure deficit (ANRC, 2016). In addition, Botswana generally followed the Hartwick-Solow rule of thumb which argued that a constant level of consumption could be sustained if the value of investment equaled the value of rents on extracted mineral resources at each point in time. This Implied that depletion of natural capital required a compensating increase in other forms of capital (Ibid). In other words, this rule implied that a country should make efforts to reinvest all mineral revenues in other productive assets as opposed to consumption.

In addition to the expenditure of mineral resource revenue on non-recurrent such as capital equipment and infrastructure, Botswana has also classified investment in human capital and development (*which includes education*) as non-recurrent expenditure. The frame of logic from the government of Botswana was that investment in human capital development would also generate future income (Ibid). In pursuit of the developmental benefit from its mineral resources, one of the prominent uses of mineral resources revenue over the years was to keep the free education policy alive, particularly in times of budget deficits and political pressure to do away with free education (Konopo, Newel, Ntibinyane, Letlole, 2016).

[8] Recurrent expenditure consists of public sector wages, consumables, maintenance costs, debt interest etc (ANRC, 2016).

[9] Non recurrent expenditure is defined as once-off capital items including capital equipment, equity injections into SOEs and large-scale public infrastructure (ANRC, 2016).

The statistics in tables 2.2 and 2.3 below illustrate the impact of this mineral resource revenue investment in education.

Table 2.2: Changes in primary school education indicators

Primary education	**1991**	**2009-14**	**% change**
No. of Schools	626	821	31%
No. of Pupils	298 812	340 065	14%
N. of Teachers	9 833	15 042	53%
Pupil/teacher ratio	30	23	23%

Table 2.3: Changes in secondary school education indicators

Secondary education	**1991**	**2009-14**	**% change**
No. of Schools	172	283	65%
No. of Pupils	73 909	172 669	134%
No. of Teachers	43 12	14 081	227%
Pupil/teacher ratio	17	12	29%

Sources: (ANRC, 2016)

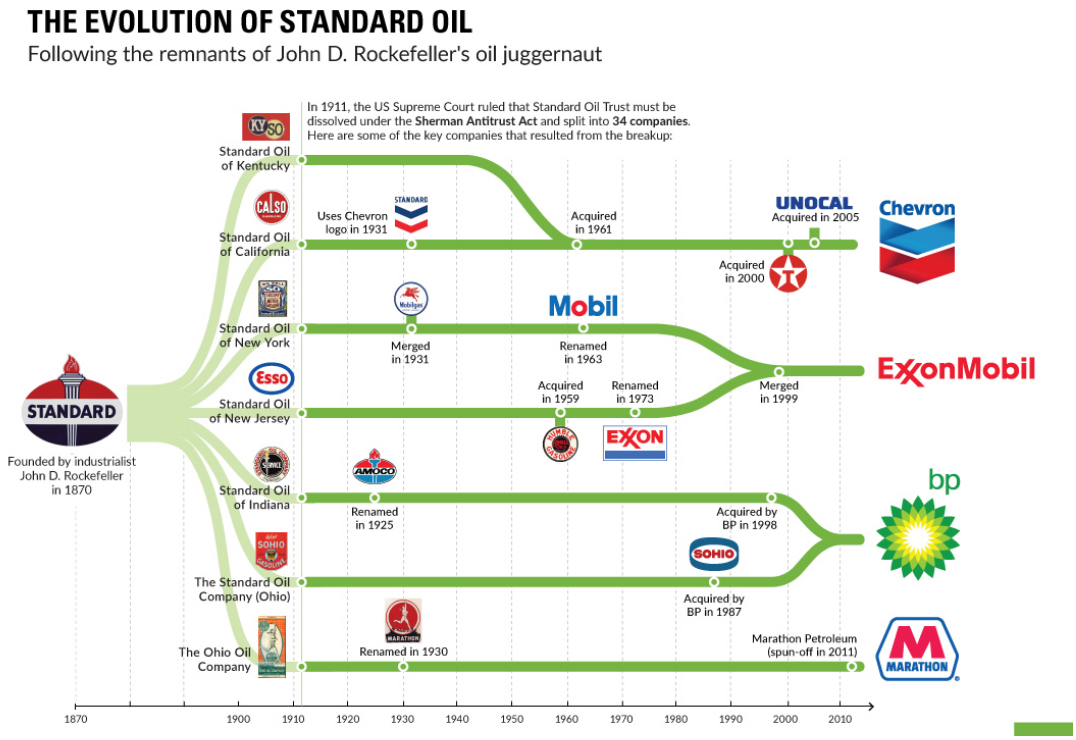
The Saudi Arabia Experience

Looking further afield, a good starting point is an international oil and gas company called Saudi Aramco. This company is not only the largest State-owned oil and gas company in the world, but also the largest oil and gas company in the world. The origins of Saudi Aramco were the signature of a concession agreement between Saudi Arabia and a company called Standard Oil Company of California (SOCAL) in 1933. SOCAL was not a small company from any perspective. It was one of the largest and perhaps historically most significant enterprises in the United States of America, founded by J.D. Rockefeller under the Standard Oil Trust of Companies. As early as 1882, the Standard Oil Trust companies owned and operated over 90 percent of upstream, midstream and downstream oil assets in the United States of America (Lane, 2018). In 1911, Standard Oil was ordered to be dissolved under the

Sherman Act of 1980 because it was viewed as being too large, partaking in uncompetitive monopolistic behaviour and preventing other market entrants (ibid).

As illustrated in Figure 2.4 below, the offshoot companies subsequently formed from this break-up are today large oil and gas multinationals in their own right, now known as Chevron, Exxon Mobil and BP.

Figure 2.4: Evolution of Standard Oil



Source: Visual Capitalist (2019).

The local company managing the SOCAL concession was later renamed ARAMCO (Arabian American Oil Company) in the 1940s. In 1973, by leveraging capital raised from extensive crude oil sales in a booming oil industry, Saudi Arabia acquired a 25 percent stake in ARAMCO and further increased this to 100 percent by 1980. The company was then renamed Saudi Aramco in 1988 (Saudi Aramco, 2019). Based on this history, it is clear that the origin of the SOE now known as Saudi Aramco was not an enterprise organically grown from within the State. Instead, it was transplanted from one of the most highly commercial and profitable private oil and gas companies in the United States of America and worldwide. The second key component was the underlying burgeoning crude oil industry and extensive crude oil sales that allowed Saudi Aramco to invest and grow the company into the oil and gas major it is today.

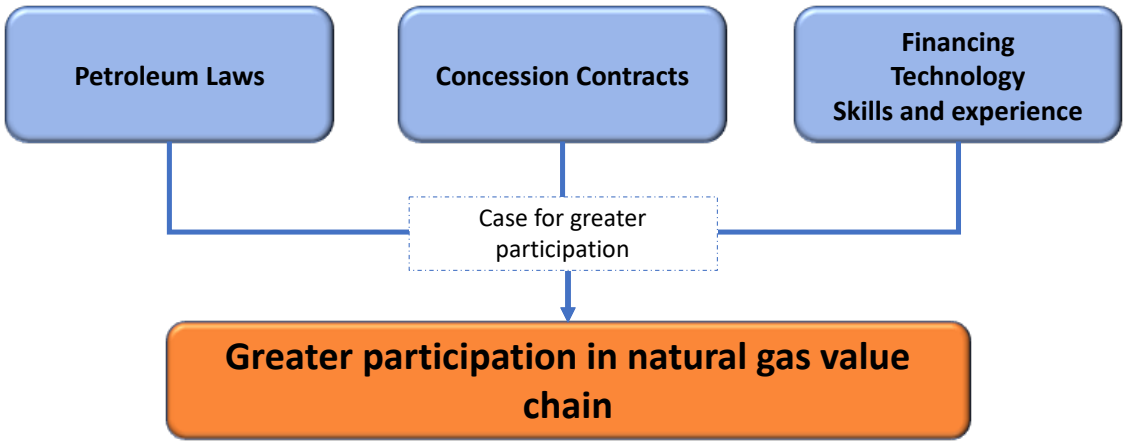
Conceptual Framework

The conceptual framework explains how the study is organised, specifically the relationship between key input variables and the associated outputs.

The first two key input variables which have a direct relationship are the applicable laws and concession contracts. Given the research question aims to determine whether Mozambique could gain greater participation in an environment where existing laws and contracts are in force, the starting point is to critically analyse the provisions of the current laws vis-a-vis greater participation in the natural gas value chain. The significance of this assessment is that laws create the organisational framework to distribute and allocate the mineral resources benefits between various actors. Prescripts contained within the laws thus provide a viewpoint of the level and extent to which the host country will be empowered to gain greater participation in the value chain. The extension of this analysis is also to interrogate previous and future natural gas projects through the lens of the concession contracts to determine what transpired in practice in relation to provisions of the laws and what is currently planned as enshrined in the future contracts.

This initial assessment provides the groundwork that determines if recommendations are contained within or should be prescribed apart from the existing legal and contractual framework and if freedom to make such provisions or recommendations is apparent in the current laws and contracts. The relevance of the historical analysis is to create a baseline from which to commence a discussion about additionality.

Figure 2.5: Conceptual framework



Source: Author's construction

The third key element of the conceptual framework relates to the key inputs/determinants that affect the ability of the host country to gain greater participation in the value chain. Key determinants such as financing and technical capability are critical to the framework of greater participation, providing entry points or creating blockages to achieve greater involvement in the value chain.

Within these key elements, specific subthemes are analysed as they create the frame and core arguments of how Mozambique could gain greater participation. These include financing prescripts, legislation, skills and experience. The culmination of these could be the measurement of greater participation through changes in critical macroeconomic data such as gross domestic product. The interaction of the above core elements of the conceptual framework create guidelines to interrogate whether greater participation is possible for Mozambique in the natural gas value chain.

Conclusion

In conclusion, the literature review provided perspectives that illustrate the theories introduced by other authors in the research area as well as empirical literature generated to validate or disprove various theories. Finally, the literature provided some insights into good practice, both in terms of participation of some of the leading SOEs in the natural gas industry globally, as well as some of the guiding principles of global natural gas legislation.

CHAPTER THREE: MOZAMBIQUE GAS

3.1 Introduction

Chapter two provided a broad review of the available theoretical and empirical literature creating an analytical framework for assessing how Mozambique could potentially gain greater participation in its natural gas value chain. Chapter three now proceeds to provide a more detailed analysis of specific elements of historic natural gas projects executed by Mozambique, the relevant contracts and legal frameworks as well as some discussion of the technical and institutional capacity demands surrounding the execution of these projects.

3.2 **The Journey to First Gas**

Oil and gas exploration activities started in Mozambique as far back as the early 1900s through explorers that discovered thick sedimentary basins onshore of Mozambique (Instituto Nacional de Petróleo [INP], 2014). Similar to other African countries, however, exploration activities ground to a halt due to poor technological advancements and exploration methods and the resulting high cost (Ibid). Exploration resumed from 1948 onwards through international oil companies, culminating in the discovery of the Pande gas field by Gulf Oil in 1961 and subsequent discoveries at Buzi in 1962 and Temane discoveries in 1956 (OECD, 2019; World Bank, 2003; INP, 2014). In the period that ensued, the fight for independence commenced in 1964, with independence being attained in 1975, however, civil war followed in 1976 (Roque, 2014), Exploration activities thus declined in the 1970s due to the political unrest from the civil war only to resume in the early 1980s through the establishment of the first Mozambique State-owned hydrocarbons company, Empresa Nacional de Hidrocarbonetos (ENH) through law No. 3 of 1981. (INP, 2014)

3.3 **Technical and Institutional Capacity Demands**

Subsequent to the civil war, peace agreement discussions commenced in 1992 culminating in the first Mozambique democratic elections in 1994 (Roque, 2014). This was accompanied by the advances in exploration technologies that saw direct hydrocarbon indicators being used to map the Pande field and later the Temane field (INP, 2014). Having come out of a civil war, Mozambique needed to build infrastructure, institutions, and the very social fabric of the nation from the bottom up. With positive prospects of a potentially viable commercial discovery at Pande-Temane, a key challenge was the lack of technical and institutional capacity to develop large scale oil and gas projects.

In years leading up to the finalisation of the Pande-Temane negotiations for production of the first gas, the World Bank as a key financing partner made inroads in assisting the government to start creating a legislative and policy framework for the energy sector in Mozambique (World Bank, 2018). The various reforms introduced by the government had the effect of converting key energy sector parastatals (Electricidade de Moçambique [EDM], ENH, Petróleos De Moçambique [PETROMOC]) into corporate entities operating within the framework of the new laws (Ibid). The reforms also sought to clarify the roles and responsibilities of various energy sector institutions. As an example, the national directorate for coal and hydrocarbons was mandated to provide oversight to the upstream oil and gas sector while the national directorate for energy was mandated to provide oversight for midstream and downstream activities (World Bank, 2003).

In 2000, the government published its energy strategy which among other principles, recognized the limited institutional and skills capacity within the country's energy industry. The strategy also emphasized decisions by the government to leverage external technical capacity assistance for negotiation and development of large energy capital projects such as Pande-Temane while in parallel developing the government's own internal capacity (World Bank, 2018). Other external technical support and capacity was also received from experienced oil and gas players such as Norway in the development of treaties and trade agreements which paved the way for the establishment of a Mozambique to South Africa gas pipeline for the Pande-Temane gas (OECD, 2019). Norway also provided extensive petroleum technical assistance to Mozambique starting as far back as the early 90s (Norad, 2018). In the Pande-Temane era, Norway provided specific support to the INP to support with key elements such as strengthening institutional capacity and the regulatory framework, as well as extensive training of geophysicists, geologists, lawyers, and economists to manage a range of activities in the oil and gas sector (Norad, 2011). The lack of adequate institutional capacity and specialist human resources capability at the time of the Pande-Temane project also drew the need for guarantees from IBRD[10] and MIGA[11] in order to protect financiers from political risk for the gas project while the government was in the process of creating and strengthening the necessary policy and regulatory frameworks.

[10] IBRD: International Bank for Reconstruction and Development

[11] MIGA: Multilateral Investment and Guarantee Agency

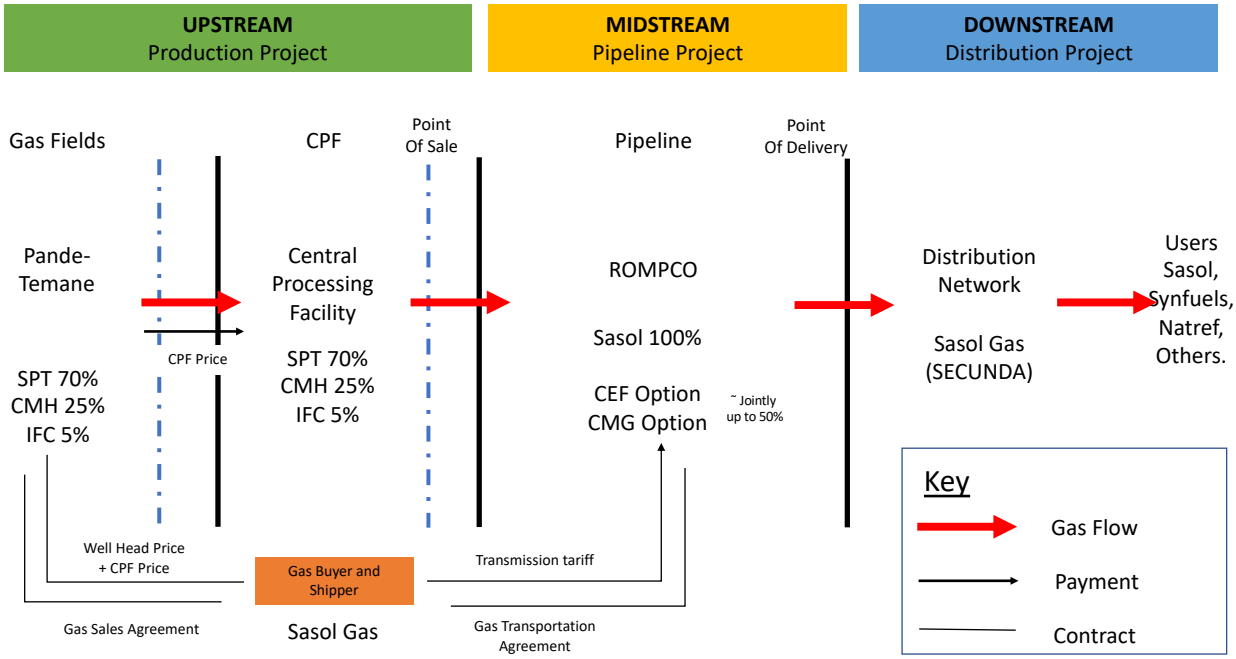
3.4 Pande-Temane Beginnings

Following the journey of creating the initial laws, regulations and policy frameworks, commercial production of natural gas in the Pande-Temane fields started in 2004 laying the foundations for an early roadmap to how, in what form, and to what extent Mozambique would participate in its natural gas value chain. Commercial development of the approximately 2 TCF of proven natural gas reserves in Pande-Temane also laid the ground-work for various improvements in the legislative frameworks that would later govern oil and gas developments in Mozambique and its associated participation in the natural gas value chain. According to the (INP, 2019), a Petroleum Production Agreement (PPA) was signed between Sasol, the government of Mozambique, Empresa Nacional De Hidrocarbonetos (ENH) and its subsidiary, Companhia Moçambicana de Hidrocarbonetos (CMH) in October 2000. The agreement principally entailed exploration and construction of a Central Processing Facility (CPF) in Mozambique to produce approximately 72 million gigajoules per annum (mGj/pa) of gas at inception in 2004, ramping up to 120 mGj/pa in 2009, and later increasing to over 183 mGj/pa (World Bank, 2003). The PPA also covered the establishment of an 865km pipeline to transport the gas produced from Pande-Temane to the Sasol Secunda plant in South Africa.

In terms of the value chain, there were three key components to the project. Firstly, upstream which included exploration and production from the gas fields, secondly, midstream which included transmission of the gas through the pipeline, and lastly, downstream which included operations at Secunda (South Africa) for in-house use of the gas by Sasol and subsequent distribution to its end-users. As illustrated in Figure 3.1 below, from a value chain participation perspective, Sasol (through its Mozambique subsidiary – Sasol Petroleum Temane [SPT]) was the designated operator of the gas fields under the PPA signed in 2000 with ENH and the government of Mozambique. In practice, this meant that Sasol was responsible for the execution of all production activities in the upstream portion of the value chain. The role of the operator is typically taken by the party capable of best managing the technological, operational and financial risk associated with the successful commercial production of the natural gas. The percentage of participatory interest (equity) in the concession is also a key determinant of how roles and responsibilities are allocated across the value chain. In the case of Pande-Temane, Sasol originally had a 70 percent participatory interest (equity stake), with the remaining 30 percent allocated to Mozambique.

Five per cent of Mozambique's portion was later assigned to the International Finance Corporation (IFC) as part of a financing deal (World Bank, 2013). In practical terms, this meant that Sasol was in effect entitled to, or allocated 70 percent of the obligations, risks and ultimately the benefits from the natural gas development project.

Figure 3.1: Pande-Temane project structure



Source: World Bank, 2003:22

In terms of participation in this value chain, Mozambique maintained its 25 percent participatory interest in the upstream activities (albeit with Sasol being the operator). Within the midstream part of the value chain, the vehicle used to execute the pipeline project was a new Mozambique registered company entitled: Republic of Mozambique Pipeline Investments Company (Pty) Limited (ROMPCO), initially 100% owned by Sasol. In terms of the midstream section of the value chain, although the pipeline was owned and operated 100 percent by Sasol at inception, the Central Energy Fund (CEF) representing the government of South Africa and Companhia Moçambicana de Gasoduto (CMG) representing the government of Mozambique had the option to acquire an aggregate of up to 50% ownership in the ROMPCO pipeline.

3.5 Mozambique Rovuma Basin Discoveries

After the discovery of the Pande-Temane fields, Mozambique further discovered what are now argued to be the third-largest natural gas finds in Africa after Nigeria and Algeria and twelfth in the world (IMF, 2019). It is estimated that between 150-200 TCF of natural gas were discovered off the shore of Mozambique's Rovuma basin in the Northern Cabo Delgado province by oil & gas majors, Anadarko and ENI (Standard Bank, 2019a). Discoveries from the Area 1 block by Anadarko were estimated by Standard Bank (2014) to potentially generate up between 10-12 million tonnes per annum (mtpa) of liquid natural gas LNG for the first phase. The Anadarko project reached the Final Investment Decision (FID[12]) in 2019. In the same period (2019), all of Anadarko's assets in Africa were taken over by the oil major Total, including the interest in Area 1 (Standard Bank, 2019a). According to Standard 2019b, the Area 4 natural gas project by ENI consists of two key projects. The first was an offshore natural gas project termed "Coral South" with an estimated production capacity of 3,4mtpa of LNG and the second was an onshore project with an estimated production capacity of up to 15,2 mtpa of LNG for the first phases financed under a project finance structure. The Coral South project declared FID in 2017, while the onshore project declared FID in 2019. For the Area 4 discovery, part of the ENI Stake (35,7%) was sold to Exxon Mobile in 2019. Subsequently, ENI and Exxon took up a joint role as operator of the Area 4 discovery (Standard Bank, 2019a).

3.6 Mozambique Natural Gas Legislation

Over the years, a series of laws have been enacted by Mozambique to govern the natural gas industry, most of which have had subsequent revisions and updates as the level of knowledge and experience of Mozambique increased with each discovery and the commercial production of natural gas. Key laws governing the sector which the literature review focussed on include the Petroleum and Mega-Projects Laws in Mozambique. These laws guide the expected level and extent of participation of Mozambique in its natural gas value chain. Within this assessment, there are some broad comparisons made to comparable/peer legislation from Ghana and South Africa to obtain a view of how Mozambique fares on a regional scale before considering how to achieve greater participation. The framework used to conduct the comparison was based on the key elements of participation to determine how

[12] Final Investment Decision (FID) represents a key project milestone of securing all required financial commitments to commence the project (construction and production)

Mozambique compared to its peers, bearing in mind the varying economic and social profiles of each country. The focus is particularly on the fundamental metrics that depict and are relevant to achieving greater participation of the host country in the natural gas value chain.

3.7 Mozambique Petroleum Law

Some initial insights to the participation of Mozambique in its natural gas value chain can be gleaned through what is commonly termed the "Petroleum Law" in Mozambique. This law was originally promulgated as Law 3 of 1981 before being superseded by Law 3 of 2001 and finally Law 21 of 2014. This was done in order to align the legal framework for petroleum activities to the evolving economic, social and political developments in the petroleum sector (Petroleum Law No. 21 of 2014). In principle, the Petroleum Law established the general rules of engagement for the execution of petroleum activities in Mozambique.

3.8 State Participation in Concessions Provisions

An analysis of the Mozambique Petroleum Law as it relates to value chain participation revealed that the defined role of the State is that of participating across all parts of the value chain from upstream to downstream to ensure the promotion of national development (Petroleum Law No. 21 of 2014). Article 20 of Law 21 of 2014 addresses State participation in the value chain, specifically stipulating that "the State reserves the right to participate in any section of the petroleum operations".

The Act articulates that such participation is to be agreed in the contract with the Concessionaires. There is also an option for the State to progressively increase its participation in petroleum operations (ibid).

The Mozambique Petroleum Law as a guiding framework does stipulate that any investor interested in exploration shall do so in partnership with ENH as the Mozambique State representative in the petroleum sector. This essentially makes provision for participation of ENH in the upstream sector. However, details of how this would be executed are only defined in the exploration and production concession contracts. When comparing these Mozambique provisions to petroleum legislation in Ghana, they are similar in that any prospective petroleum investor in Ghana must enter into a partnership with the government of Ghana and the Ghana National Petroleum Corporation [GNPC] (Petroleum Exploration & Production[E&P] Act of 2016).

In the case of South Africa's petroleum laws, no specific provisions require a potential investor to enter into a partnership with the State (Mineral and Petroleum Resources Development [MRPDA] Act, No. 28 of 2002 as amended 2009). The current South African MRPDA amendment bill of 2013, however, makes some new proposals with provisions for the State to have guaranteed participation in petroleum contracts. At the time of writing of this dissertation, this amendment bill was yet to be enacted into South African law.

3.9 Domestic Gas Allocation Provisions

Within Mozambique's Petroleum Laws, provisions for domestic gas (which can be considered a key vehicle to participate in the downstream sector of the value chain) are contained in Article 35 of Law 21 of 2014, stipulating that no less than 25% of all gas produced must be for the domestic market. It is important to note that when the first commercial natural gas project took place in Mozambique, the Pande-Temane project in 2000, this provision in the Petroleum Law did not exist. It was only through after-the-fact negotiations that some domestic gas was provided to ENH for local use in Mozambique, principally through receipt of the petroleum tax "in-kind" as gas as opposed to receipt as cash. According to Human (2019), Mozambique received an estimated 30 mGj/a during the Pande-Temane project.

When contrasted with laws in Ghana, at the writing of this dissertation, 100% of all, natural gas produced in Ghana is allocated to the domestic market while 100% of the crude oil produced is for export (Adadzi & Amamoo, 2019). The South African laws, in contrast, do not make express provisions for domestic allocation in the original MPRDA Act 28 of 2002 as amended in 2009.

3.10 Mozambique Mega-Projects Law 15 of 2011

Further definition of prescripts governing the extent, scope and scale of Mozambique's participation in the natural gas value chain are enshrined under the "Mega-Projects" Law 15 of 2011 which governs public-private partnerships, large-scale projects and business concessions. The intention of Law 15 of 2011 is to recognise the need to ensure that the efficiency of capital and technology deployment for large-scale projects is not inhibited and the State must participate in the projects to ensure the population benefits from the country's natural resources.

The legislation thus intends to allow greater involvement of private sector finance, technology and expertise, while ensuring the equal, efficient provision of goods, services and benefits to society (Mega-Projects Law No. 15 of 2011).

Although these two central objectives are not mutually exclusive, the mechanism and approach to executing on them through the concessions is the difference between one objective outweighing the other in terms of substantive implementation and recognition. The implementation is accordingly produced through the exploration production and concession contracts which ostensibly interpret the legislation and attempt to abide by its prescripts while simultaneously balancing the interests of the two key parties to the contract – the private investor/operator and government of Mozambique.

3.11 Participatory Interest Provisions

In relation to sharing of mineral resources benefits, the Mozambique Petroleum Law further makes provision for allocating benefits based on the quantity and quality of the resources made available for the natural gas project by each party (Mega-Projects Law No. 15 of 2011). This could be interpreted to demonstrate the importance of the participatory interest (equity) which translates into the proportion of expenses covered for development and operations, as well as the share of benefits received between the private developer and government. Furthermore, the degree of responsibility undertaken by each party is also a critical consideration for the allocation of benefits (ibid). Mozambique Law 15 of 2011 prescribes that the State must possess no less than 5% and no more than 20% of share capital or equity in the development (the participatory interest). There is, however, no further specification of how the participation of the State is further secured across the various parts of the value chain.

The literature review revealed that the mechanics of how the Concessionaire spreads itself across the value chain has by default been left to the party with the allocated responsibility of "operator" which coincides with the party that has a higher participatory interest in the development (Petroleum Operations Law No. 2 of 2014: 96).

As a result, because the specific participation at various levels of the value chain is not quantified, the default position is that decisions are controlled by the party with the greater participatory interest and corresponding expense carrying allocation. This could be interpreted to mean that ENH essentially has voting rights equivalent to the value they bring

to the concession, which in the case of the current concessions could be argued to be very little, given the high cost of securing the State's participatory interest. Standard Bank (2019) estimates that the peak funding required for all of ENH's participatory interest (equity) obligations will potentially reach up to USD 11-12 billion by 2029 (Standard Bank 2019). Concessions concluded in Area 4 specifically stipulate, however, that the other parties involved must finance ENH's equity component to be repaid by ENH when commercial production begins (ENI Area 4 Contract, 2006: 20).

When compared to regional legislation, petroleum laws in Ghana stipulate that no less than 15% of participatory interest must be allocated to the State (Petroleum E&P Act of 2016). In the case of South Africa, the current MRPDA Act 28 of 2002 and its associated amendment of 2009 makes no specific provision for how much participatory interest is for the State. However, the amendment bill of 2013 makes provision for a 20% free carry participatory interest for the State with options to acquire additional interests at an agreed price (MRPDA Act, No. 28 of 2002 as amended 2009; MRPDA Amendment Bill, B15D of 2013). These prescripts that relate to responsibility and allocation of risks/rewards are important to the value chain debate, as they recognise the significant role of how much participatory interest a State secures and the link to subsequent sharing of benefits and obligations that accrue to the State.

3.12 Skills Development and Technology Transfer Provisions

Finally, consideration must be given to laws concerning technology transfer and skills development. Matters relating to technology are relevant in that they could be key with regards to creating a capability that can progressively allow greater State participation in more complex parts of the value chain. From a capacity-building perspective, Mozambique's Law 15 of 2011 makes general reference to the need for transfer of know-how and technology and promotion of greater economic inclusion for Mozambicans in natural gas projects as well as the development of national capital markets (Mega-Projects Law No. 15 of 2011). There also appears to be a generalised reference to the need for the Concessionaire to cater for training and development, and creation of export capacity and internal market needs; however, there are no specific provisions for embedding the State as a participant in all parts of the value chain through technology transfer and skills development.

Those above can be compared to Ghana, which has a fully-fledged separate and stand-alone law within the petroleum sector regulating indigenous participation, skills and technology transfer. Ghana's local content and local participation regulations of 2013 were specifically enacted to ensure the maximum participation of the host country and its indigenous inhabitants, increasing local expertise and experience and also safeguard against the interest of foreign participants in the oil and gas sector. Ghana's local participation laws also further identify specific services for oil and gas which can only be sourced from Ghana, such as legal services (Petroleum Local Content and Participation Regulations Act of 2013). The Ghanaian local content laws also request detailed plans for training, research, development, technology transfer, legal and financial services as an essential requirement for execution of natural gas projects (Adadzi & Godson-Amamoo, 2019)

In the case of South Africa, provisions are indeed made for local content within natural gas projects with calls for what is classified as substantive and meaningful participation of previously marginalised persons, including women and local communities through the expansion of opportunities in the petroleum sector (MRPDA Act, No. 28 of 2002 as amended 2009).

3.13 Enforcement of Contract Provisions and Regulations

Within the limitations of what Mozambique managed to negotiate in the Pande-Temane contract and the existing laws at the time, the general observation was that there was adherence to the contract provisions and regulations as agreed between the parties. A key factor in this ability to ensure the enforcement of the contract provisions and regulations was likely the external capacity support which Mozambique leaned on through partners such as the World Bank, the Norwegian government, and indeed Sasol.

The technical engineering components of the project were noted to have been completed on time and within the engineering specifications. (World Bank, 2013; World Bank 2018). In terms of environmental provisions, the World Bank noted that the project was implemented within the limits of its environmental and social safeguards. In particular, Sasol was noted to have provided the required annual integrated disclosure reports including full audits of the environmental issues identified and corrective actions taken (World Bank, 2018).

From the financial management perspective, Sasol was observed to have been compliant with the World Bank's fiduciary reporting requirements in line with international fiduciary reporting expected from a company of its nature listed publicly on the Johannesburg and New York Stock exchange (Ibid). Both Sasol Pande-Temane (SPT) and ROMPCO were noted to have provided adequate financial reporting in line with petroleum operations requirements, including the use of competitive procurement for all major contracts such as the Central Processing Facility (CPF) and the ROMCO Pipeline (Ibid).

In terms of job creation requirements enshrined in the contracts and regulations, the key observation was that significant short-term employment opportunities were created, however, there was limited direct long-term employment. As an example, an estimated 3200 temporary jobs were created during the construction phase with over 50 percent being filled by Mozambican nationals. As of 2018, however, an estimated 200 local nationals were observed to be employed on a permanent basis across Sasol's Mozambique operations (Ibid). Fulfilment of obligations on the part of Sasol for local community development was observed to have some strengths and weaknesses despite notable efforts being exerted. As an example, although as of 2017, Sasol had invested an estimated USD33 Million in community development projects, these focused mostly on the establishment of infrastructure such as schools, clinics, and water supply. While commendable, the efforts lacked sustainability due to lack of trained personnel to sustainably run these facilities [*e.g well-trained teachers, health care workers, and engineers*] (Ibid). It can be debated as to whether the responsibility was on the government or Sasol to ensure the training of personnel to operate various infrastructure which was established. Overall, World Bank Programmes which formed a key part of the technical assistance package for Pande-Temane such as the Energy Reform and Access Project (ERAP), Gas engineering Project, IFC support for gas distribution among others were instrumental in assisting Mozambique. These programmes supported the creation of internal capacity for project development, contract negotiations, policy, regulatory and institutional design for the Pande-Temane project and indeed laying the groundwork for future natural gas projects to come (World Bank, 2013).

3.14 Conclusion

In summary, among other intentions, the Mozambique Petroleum Laws, when compared to regional laws, provided a broad framework through which new laws could be instituted to further guide participation of Mozambique across the natural gas value chain as the host country. A key question to be asked concerning the adequacy of State participation however is whether the provisions in the Mozambique Petroleum Law were sufficient, or if firmer, more concrete prescripts were necessary. The issue of adequate participation of the State, in essence, starts at the level of the Laws, however, if these are not sufficiently robust, subsequent efforts become merely a patch work of interventions to try and attain greater value from the natural resources.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

The primary objective of the study was to determine whether Mozambique could gain greater participation from its natural gas value chain.

Secondary research objectives included the following:

- To understand the history of Mozambique's participation in its natural gas value chain.
- To determine the legislative frameworks that are in place to help Mozambique achieve greater participation from its natural gas value chain.
- To determine concession contract provisions relevant to participation in the value chain.
- To determine barriers that hinder achievement of greater participation in the natural gas value chain.

4.2 Research Design

A case study approach investigated the research objective to examine the underlying complexity of the issues. Simons (2009) supports this notion stipulating that this approach allows for the detailed exploration of information and narratives from multiple perspectives and takes into account the complexity and uniqueness of a particular policy, project, programme, institution or system within its context. Harrison, Birks, Franklin and Mills (2017) agree stipulating that this methodological approach is particularly useful to better understand the complex relationships between institutions, practices and processes.

The literature review conducted revealed that both quantitative and qualitative research methodologies have been utilised for previous studies on this subject. There is available research using quantitative research methodologies on the topics of natural gas project financing, ownership and resource-based industrialisation. These studies used survey and statistical modelling research methods. Quantitative research methods can be advantageous where there is a need to measure variables such as how much, how many, and to what extent (Rahman, 2016). Quantitative research methods can also be useful where a phenomenon is

best represented and analysed as frequencies whose associations with each other can be studied using statistical and other numerical techniques (ibid). In the case of this research study, a qualitative research design was selected given that the nature of the research objectives did not depend on analysis of statistical data to support the arguments made in the research findings, but rather, contextual analysis from applicable laws, contracts and historical project developments. For qualitative research, the collection of data and its analysis is sensitive to the context within which it occurs and aims to provide a holistic understanding of the subject. In contrast, quantitative research is more suited to structured, standardised and abstracted modes of conducting empirical data analysis (Eriksson & Kovalainen, 2011).

For this study, the qualitative research method was the most appropriate as it aims to produce rich, nuanced and well-rounded perspectives (Button, 2019). The qualitative research method is well suited for investigations into laws, contracts, organisations and policies – all four of which were key elements of this study (ibid). Limited time and resources available were also contributing factors to applying the qualitative method. By nature of the research objectives and core tenants, an inductive approach was selected for this qualitative study.

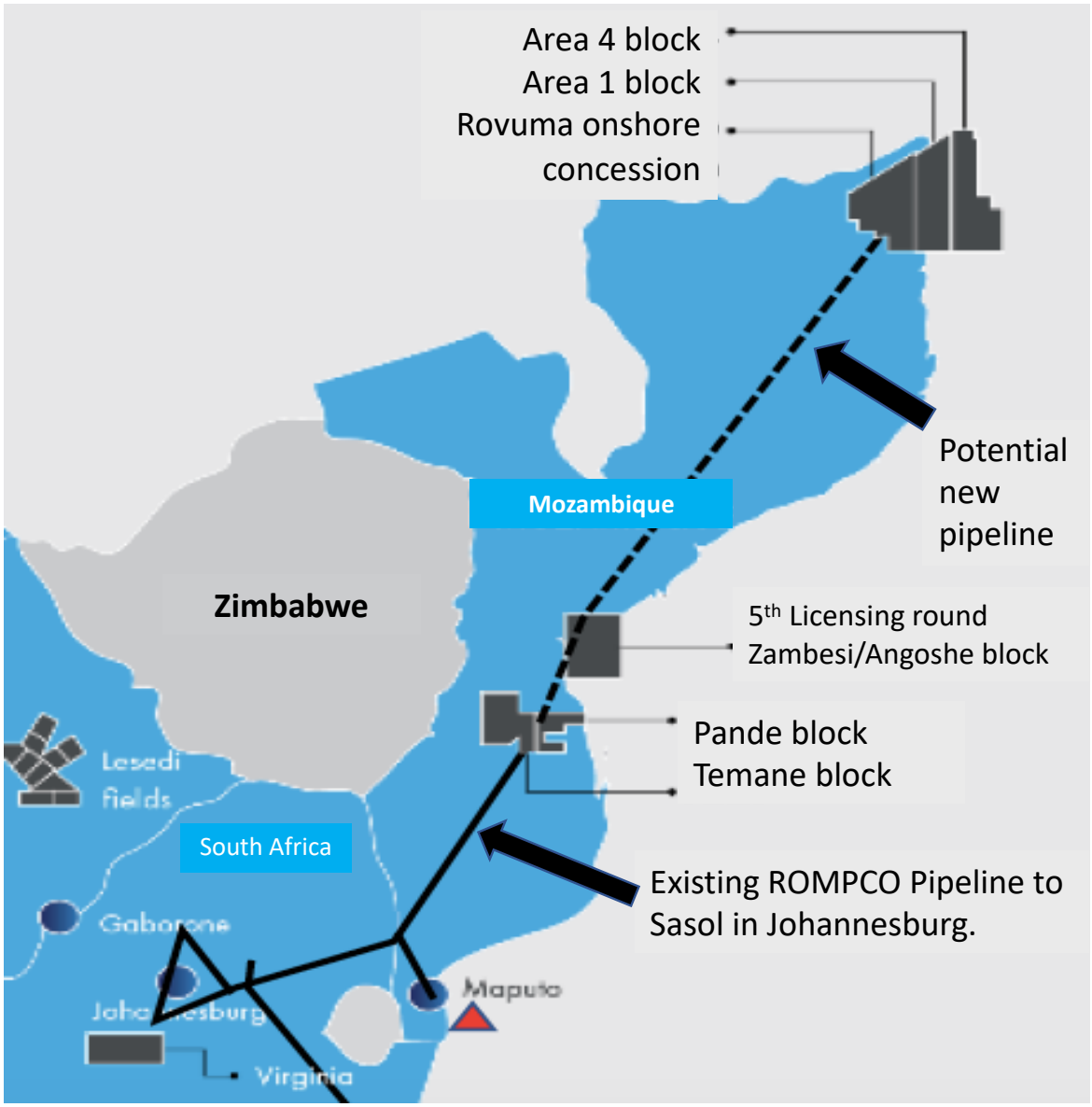
4.3 Research Scope

The study was based on applied research in the field of mineral resources management. The research covered SOEs involved in demand and supply of natural gas, private companies engaged in concessions for production and exploration of natural gas, key State institutions involved in regulation and oversight of the natural gas sector and financial institutions concerned with the financing of natural gas projects.

As illustrated in figure 4.1, the geographic scope was limited to Mozambique and sector scope to natural gas. Analysis of natural gas blocks was limited to the following geographic areas:

- Pande -Temane; and
- Area 1 and Area 4 (Rovuma Basin).

Figure 4.1 Research geographic scope



Source: Human, 2019

4.4 Research Methods

Flick (2007) emphasises that a qualitative research method makes use of text as empirical evidence (as opposed to numbers). This is demonstrated in the methods used in this study wherein within the case study methodology, the specific "text" or information required for the core arguments was extracted from the relevant laws and contracts which give insights into the prescripts for participation dynamics in the natural gas value chain. Secondary information on best practices within the industry was required to assess how other countries have gained access to greater participation in the value chain and under what conditions.

Flick (2007) also articulates that qualitative research is specifically concerned with views of participants, in daily practice and knowledge. Expert opinions through interviews provided the additional supporting evidence, principally to support the arguments generated from analysis of the laws, contracts and best practice as well as to contextualise and give expert insights into the findings.

In order to obtain the core data required for the research objectives, key information sources included online resources such as State information portals, university library portals, private company information portals and written correspondence with experts. Secondary information from expert opinions was obtained through interviews.

4.5 Target Population

The target population included State Owned Entities (SOEs) tasked with managing the natural gas projects for each respective country. The population also included multinational oil and gas companies with direct involvement on the private sector concessionaire side of the transactions, specifically, respondents with knowledge of the technical and commercial aspects. Finally, the population included organisations with direct and on-going knowledge of the financing of the natural gas projects including private and public sector banks, insurers and private equity investors.

4.6 Sampling

For the expert interviews, purposive non-probability sampling was utilised given that the approach was not to obtain a representative sample, rather, to obtain specific insights from experts that aligned with particular characteristics unique to the research objectives. Saunders et al. (2016: 297) provide some guidance regarding the appropriate sample size and response rate where non-probability sampling is utilised based on a semi-structured interview as in this dissertation.

> *For all non-probability sampling techniques, other than for quota samples, the issue of sample size is ambiguous, and, unlike probability sampling, there are no rules. Rather the logical relationship between your sample selection technique and the purpose and focus of your research is important, generalisations being made to theory rather than about a population.*

In relation to response rates, Saunders et al. (2016: 441) articulate the following for likely web and mobile questionnaire response rates: "variable to low response rates of 30%-50% are reasonable for web within organisations, otherwise, they can be 10% or even lower."

A sampling frame was not particularly relevant given the use of purposive/criterion sampling for the expert interviews. The sampling frame was also not found to be relevant because of the limited number of interviews conducted to obtain in-depth expert opinions for the specific respondents.

Table 4.1 below provides a summary of the main criteria utilised to filter and identify target respondents and organisations under the purposive sampling method.

Table 4.1: Filtering criteria used for the purposive sampling

Types of organisations	Scope of involvement	Types of individuals
SOEs directly involved in the Mozambique value chain	- Institutions involved in demand-side production, transportation and distribution of gas - Institutions that cover regulatory functions of natural gas - Institutions involved in supply-side dynamics	Executive Manager, COO or CEO level (current or former)
Financial institutions directly involved in current or previous natural projects	- Institutions providing, debt, equity or political risk cover to natural gas projects in Mozambique	Extensive technical, financial, institutional, legal or commercial knowledge of natural gas projects in Mozambique and globally
Oil majors (large multinational oil and gas companies) currently or previously involved in Mozambique natural gas projects as well as global gas projects in general	- Current or former Concessionaires - Global players in the natural gas space	20-40 years' experience in the sector

4.7 Interviews

Interview requests were sent via the web (email). Once confirmed, the interviews were conducted telephonically or as face-to-face interviews. The researcher travelled to Maputo, Mozambique to conduct some of the interviews with the identified respondents. All other interviews were conducted telephonically with respondents headquartered in South Africa.

A semi-structured set of questions allowed flexibility in the answers to the research questions as well as discussion of any unexpected critical topics during the interviews. Each interview was between 45–60 minutes. Meticulous notes were taken for each interview. The respondents were also engaged after the interview for essential follow-up information as required to meet the research objectives.

Due to the sensitive nature of the information and language barriers, interviews were challenging to secure. To overcome the language barrier, the researcher identified respondents who spoke English in Mozambique. In total, 15 experts were approached, but only seven successfully interviewed. The demographics of the respondents are summarised in table 4.2 below.

Table 4.2: Respondent demographics and characteristics

Respondent ID	Respondent seniority	Key respondent characteristics	Section of value chain	Years' experience
R1	Director	Technical, institutional and commercial knowledge of current and previous Mozambique natural gas projects	Upstream, midstream and downstream	>20 Years
R2	CEO	Technical, institutional and commercial knowledge of current and previous Mozambique natural gas projects	Upstream, midstream and downstream	>30 Years

Respondent ID	Respondent seniority	Key respondent characteristics	Section of value chain	Years' experience
R3	COO	Technical, institutional and commercial knowledge of current and previous Mozambique natural gas projects	Midstream	>20 Years
R4	Executive Manager	Technical, institutional and commercial knowledge of current and previous Mozambique natural gas projects	Midstream	>13 Years
R5	Former CEO (Rtd)	Commercial, institutional, technical knowledge	Upstream, Midstream and Downstream	>40 Years
R6	Executive Manager	Financial and institutional knowledge	Upstream, midstream, Downstream	>15 Years
R7	Former Executive Manager (Rtd)	Technical, institutional and commercial knowledge of previous Mozambique natural gas projects	Midstream	>40 Years

4.8 Research Instrument

Research instruments utilised to collect information in response to the research objectives were the following:

- Document review of relevant laws and concession contracts
- Semi-structured interviews (face-to-face and telephonic)

4.9 Analysis and Findings

The approach to conducting the analysis and presentation of data commenced with a detailed look at comparable or peer legislation within South Africa and Ghana. These legislative frameworks were assessed as part of the literature review to obtain a basis for how other similar oil and gas producing nations on the continent can be compared against Mozambique. A detailed assessment of the Mozambique laws determined the provisions encapsulated in this legislation aimed at fostering greater participation. A broad comparison compared the South African and Ghanaian legislation against Mozambican legislation.

On a practical level to identify potential entry points where Mozambique could potentially gain a greater benefit, demand and supply, financing, commercialisation and domestic gas strategies were assessed.

Leaning on the above analysis framework, feedback from the expert interviews provided context and ideas for potential entry points. Expert interviews were particularly significant to provide practical ideas based on experience within project execution, financing, institutional structuring and legislation for natural gas projects.

4.10 Limitations of the Study

Although the study area broadly relates to public policy for mineral resources management, the detailed analysis was limited to energy resources and more specifically, natural gas. The study did not cover casual relationships between other mineral resources such as coal, iron ore and diamonds and the ability of countries to extract higher value from these mineral resource clusters.

Another limitation of this study was the fact that Africa is not one country, instead 54 countries with varying political, social and political nuances. Extrapolation of the results of this study can thus only be limited to the core principles and fundamental arguments. As an example, the relationship between South Africa and Mozambique with regards to the natural gas pipeline established is unique to this bilateral relationship. However, the principle of domestic gas and a need for more provision to have been made for Mozambique to benefit as the supplying country compared to South Africa as the receiving country can be extrapolated across to other countries and mineral resources.

Another limitation noted was the analysis conducted on the concession contracts for Mozambique. Firstly, the analysis was limited to those concession contracts that reached FID and either completed, started or were in the process of commencing construction activities. The analysis of concessions was also restricted to understanding how they implemented the legislative prescripts for ensuring adequate participation of the country in the natural gas value chain. As an example, a specific analysis of the extent of the need for training, skills and technology transfer was recognised and implemented through concessions was examined, however, elements such as differences in varying tax regimes between concessions with no material bearing on participation were not analysed.

Another limitation was that greater participation of Mozambique in the value chain is broadly defined to include the State, local private sector and local communities. The dissertation did not provide analysis specific to each element. This aspect was noted as an area for future study in terms of core policies and frameworks specific to the State, local private sector and community participation. The dissertation thus provided perspectives on Mozambique as a whole concerning how the country could gain greater participation.

The final limitation of this study was that due to the time and resources constraints, and the study focused on a qualitative assessment of the central question whether Mozambique could potentially gain more significant benefit from its natural gas value chain. The study did not cover the potential quantum of what such potential benefit would be if it was achieved.
Such quantification requires an entirely separate study utilising a quantitative empirical approach and possibly modelling techniques to extrapolate the value of potential benefit across multiple variables. Accordingly, this was noted as an area for future study.

Conclusion

In conclusion, the research design, approach and methodology as discussed in this chapter provides a clear and concise framework for how the research was structured, executed and documented.

CHAPTER FIVE: ANALYSIS AND FINDINGS

5.1 Introduction

This chapter provides an analysis and findings from the research conducted. In terms of the historic projects analysis, focus was placed on the Pande-Temane project (Sasol concession), Area 1 project (Anardako[13] – now Total concession), and Area 4 project (ENI[14] – now Exxon Mobil concession). The analysis on legislative frameworks focused principally on the petroleum law of Mozambique (Law 21 of 2014) and Mega-Projects law (Law 15 of 2011). The analysis of research objective three focussed on the Pande-Temane concession, Area 1 and Area 4 concession contracts. Finally, the analysis of research objective four focused on key entry points for greater participation, including financing dynamics, domestic gas and skills development.

5.2 Research Objective 1: Findings on the history of Mozambique's participation in its natural gas value chain.

The research revealed that Mozambique could have had greater participation in its first natural gas project, the Pande-Temane Sasol concession. As respondent 3 put it, "It can be debated as to whether Mozambique gave the gas away too cheaply, or if they could have gotten a better deal". The answer to whether Mozambique provided the gas too cheaply is somewhat complex in that there were many factors at play in the Pande-Temane project. In the first instance, Mozambique had just emerged from a civil war with an impoverished and struggling economy desperately dependent on foreign aid. As such, any prospect of generating additional fiscal revenue would have been attractive. In the second instance, the gas that was discovered by Sasol was to an extent "stranded gas" with no readily available domestic market, and there was a high probability that if Mozambique did not take the terms proposed by Sasol, the gas could have remained in the ground for much longer with no subsequent benefit to Mozambique at all. The crucial factor worth considering was that Mozambique never implemented any oil and gas projects. As such, the requisite laws were not in place or suitably designed for the eventualities of this concession contract wherein no provision was initially made for domestic gas. The government also did not possess the

[13] Anadarko is a global oil and gas company

[14] ENI is a global oil and gas company

essential experience and technical capability to provide the appropriate advice regarding the most expedient negotiating position. The result was that there were few options available for Mozambique, and ultimately their minimal participation in downstream activities was mostly because there were no alternative options offering a better result. To support this analysis, respondent 5 indicated that "at the end of the day, the level of participation of the host country in the value chain is down to the options available".

Simulation of Multiplier Impact on Domestic Gas in Mozambique

Another key area where Mozambique could have received greater participation in the Pande-Temane project was that of domestic gas. Domestic gas is natural gas allocated from production to be used locally or sold to the host country. The principle relates to a certain amount of natural gas from the production fields for use by the host country in residential, industrial and commercial spheres of the economy. In the case of the Pande-Temane project, there was no provision for domestic gas at the inception of the concession.

The significance of no reference to the inclusion of domestic gas in the initial Pande-Temane project is relevant as it relates to the participation of ENH in downstream activities and the potential for greater industrialisation benefits. The implication is that in addition to revenue benefits generated from taxes and export sales of natural gas, additional benefits can be produced from the utilisation of the gas by the host country in the domestic market. Of particular importance is the utilisation of natural gas to kick start and boost economic activity through industrialisation. The generation of power through gas-to-power projects is vital to ensuring that industries have adequate power for manufacturing, beneficiation and other industrial processes. The supply of domestic gas if utilised appropriately generates a multiplier effect of growth and development within the local economy.

The analysis by Smelcer (2019) and Standard Bank (2014) corroborates these findings. In Smelcer's analysis, a good example given is Qatar as a country that managed to gain greater value from its natural gas through appropriate participation in the value chain, principally using domestic gas. As illustrated in Table 5.1, Qatar used its domestic gas appropriately, and this was the main reason for the growth of its GDP from USD 17.5 billion in 2001 (prior to commercial development of its natural gas) to USD 170 billion in 2011 post-commercial development and utilisation of its domestic gas (Smelcer, 2019).

Table 5.1: Multiplier impact of domestic gas on Qatar.

Multiplier Impact of Natural Gas on Qatar			
	2001	Multiplier	2011
GDP (USD billion	17,5	9,7X	170
GDP per capita	27000	3,6X	98000
Qatar Stock Market Capitalisation (USD billion)	12	10X	125
Banking Assets (USD billion)	16	12X	190

Source: Smelcer, 2019

An application of the multiplier effect of 9,7 experienced in Qatar to the GDP figures for Mozambique reveals that the GDP of Mozambique should have increased to USD61,4 billion between 2001 and 2011, however, the actual GDP of Mozambique in 2011 was USD10,78 billion (World Bank, 2019). This analysis provides some perspective into the potential benefit for Mozambique had it adequately utilised its natural gas from the Pande-Temane project for local industrialisation.

Table 5.2: Simulation of multiplier impact of domestic gas on Mozambique

Simulation of Multiplier Impact of Natural Gas on Mozambique				
	2001	Multiplier	2011* (If multiplier applied)	2011** (Actual)
GDP (USD billion	6,33	9,7X	61.4	10,78

Source: Author's calculations*, World Bank (2019)**

It is evident from the development and rollout of the Pande-Temane project from a participation perspective that ENH initially did not see the relevance or was not aware that its participation in downstream activities, principally through domestic gas could have had a much greater and wider-reaching impact in its economy due to the ability to unlock industrialisation. To this end, respondent 1 indicated that:

At ROMPCO, we were desperate, we had just come out of a civil war, and we needed investment, so the domestic gas wasn't even specified. Gas to Matola (Mozambique) and others in Mozambique only came in later as an afterthought. The bulk of the gas was exported to South Africa.

The argument is that ENH was also to receive financial benefits from the petroleum tax, production bonuses and its profit petroleum share of gas sales. However, the realisation was that these benefits were prone to the maladministration of public funds and general leakage of foreign currency due to the inadequate financial systems.
Domestic gas, however, would have injected itself directly into the economy through gas to power, industry and residential usage programmes. Respondent 6 gives credence to this analysis stipulating the following:

Mozambique is better of focusing on the downstream and industrialising in the country. There are more licensing rounds coming. So perhaps they can focus on industrialising the country, creating a local demand base, strengthen the economy, becoming a regional supplier over the next ten years and by the time the fifth licensing rounds yield something – they may be ready to participate in upstream.

In response to the question of what is the appropriate balance of participatory stakes that can ensure an efficient and well-balanced project, respondents alluded to the need for proportional allocation of the participatory interest across all sections of the value chain.

In reality, an LNG project is best run if there is an equal stake for all parties in all the parts (regardless of %) – but there must be aligned interests (e.g. 10% upstream 10% midstream 10% downstream) – if you have one party with a high percentage in upstream and a lower percentage in downstream, you get all kinds of dysfunction. It is important to have aligned interest across the value chain – but if you have 5%, you must also carry the costs and take 5% of the revenue – a full interest with all the rights and obligations (Respondent 5).

5.3 Research Objective 2: Findings on frameworks that are in place to help Mozambique achieve greater participation from its natural gas value chain.

The other key component of the value chain in which Mozambique could accrue significant benefits beyond revenue from taxes and the sale of gas is the domestic gas programme. As articulated under the Pande-Temane analysis, domestic gas is vital to unlocking industrialisation and broader economic activity through projects such as gas to power, gas to liquids and ammonia for fertilizer. A key finding of the research was that the legislation which instituted the requirement for domestic gas to be allocated to the State from production was only implemented in 2014 through the Petroleum Law 21 of 2014. The concession agreements for Area 1 and Area 4, however, were concluded and signed in December 2006.

It was thus in a period post-signing of the concessions that new Petroleum Law 21 of 2014 was enacted to align with the expectations of the Mozambique government to receive a percentage allocation of domestic gas. In response to this new law, commitments were subsequently made by Area 1 and Area 4 Concessionaires to fulfil the newly legislated requirements for domestic gas to be available to the State. In essence, when the recent Area 1 and Area 4 concessions were concluded, the legislative framework related to domestic gas (which is a fundamental law for participation) was not yet in place and as a result, after-the-fact provisions had to be established to deliver on the domestic gas aspirations of Mozambique.

Social Licence to Operate in Mozambique

These findings are supported by the analysis from Standard Bank (2019) clearly articulating that the Area 4 Concessionaire ultimately supported domestic gas allocation, with a caveat that was as long as it did not interfere with the development of any of the LNG trains[15]. Review of the concession contract revealed that the concession did not make specific mention of domestic gas allocation, however, after passing the law, the Concessionaire made some provision to supply domestic gas to Mozambique.

[15]LNG Train definition: To liquefy natural gas, it must be cooled to negative 160 degrees Celsius (about negative 260° Fahrenheit). The liquification plant, known as a train, involves a process consisting of a progression of connected steps where the raw gas is purified first, then cooled to the required temperature. (Source: IMF, Country Report No. 19/167, P7)

The provision of domestic gas on these terms was analogous to a "social license" to produce LNG in Mozambique, which was fulfilled by what could be argued to be a voluntary commitment by the Concessionaire to sell gas to Mozambique for domestic use on commercial terms (Standard Bank, 2019:92). Although the concession agreements contained no obligations for domestic gas allocation, from a technical perspective, the voluntary domestic gas commitments were approved as part of the Plan of Development (POD) for Area 1 and 4 which are crucial steps to allow the Concessionaire to proceed to FID (Standard Bank, 2019a). From this viewpoint, when compared to the execution of the Pande-Temane concession, it can be argued that there was progress in terms of Mozambique's potential participation in the downstream part of the value chain through domestic gas allocation in Area 1 and Area 4 compared to Pande-Temane.

Challenges in Formulating Legislation

The respondents also raised the issue of legislation as an area that is often lacking for countries that discover oil and gas resources. In the case of Mozambique, respondents indicated that Mozambique was not prepared for the gas discoveries. Perspectives on how the Pande-Temane project unfolded included the following from respondent 6:

> *One of the challenges with Pande-Temane was that Mozambique didn't have petroleum laws. So, they were not familiar with key dynamics of royalties, taking gas in-kind as opposed to in cash and how to price the gas. So, there was really a lack of knowledge around the commercial aspects. At the time all they knew was the 2% royalty gas, which is the international standard – this they took in kind which went to Matola and their local use* (Respondent 6).

Respondent 5 went a step further to articulate common scenarios that unfold when it comes to the creation of natural gas legislation, and stated the following:

> *What usually happens is gas is discovered on fairly minimalist terms – the government then decides they need petroleum legislation and they then seek advice from the very prospective Concessionaires who have more experience. The legislation thus invariably favours the prospective Concessionaires.*

One could argue that from the onset, it is not a fair fight, however, at the time of helping set up legislation, the prospective Concessionaire would be constrained by the following:

(1) *There are general international standards – which stipulate what percentage of the resource must flow back to the host nation*

(2) *Operator knows that if the participatory allocation is too little then its unsustainable and the deal will crumble*

(3) *Then there is the local resource holding company, the petroleum SOE, which could put the brakes on everything if it's unfair* (Respondent 5*).*

5.4 Research Objective 3: Findings on concession contract provisions relevant to participation in the value chain.

An analysis of Area 1 and 4 contracts revealed that the majority of the provisions of both contracts concerning impact and relevance on value chain participation were mostly similar. Some differences existed in terms of the special provisions for taxes and associated exemptions (e.g., capital gains tax provisions). However, these fell outside the scope of the dissertation.

Concession Contracts

One key observation from the research was that since the signing of the concession agreements for Area 1 and Area 4 in 2006, there was an extensive delay in finalisation of the requisite approvals required for the LNG projects to progress, specifically, approval of the POD. One reason emanating from the interviews was that Mozambique took its time to ensure that they ultimately received a better deal for their Area 1 and Area 4 gas in contrast to the overall outcomes of the Pande-Temane project. Respondent 6 articulated:

To an extent progress on Area 1 and Area 4 delayed because ENH had the battle scars of Pande-Temane – so they wanted to make sure the operator does not underpay for the gas – so during 2011-2015 period, they went through a period of saying lets rather make no decision – than to make the wrong decision, like we did for Pande-Temane (Respondent 6*).*

Participatory Interest Provisions

In terms of participation in the natural gas value chain, Area 1 and Area 4 contracts stipulate that the other parties shall fund the participatory interest of ENH in the concession until commercial production of natural gas begins (Anadarko Area 1 Contract, 2006:33; ENI Area 4 Contract 2006:35). Once commercial production commences, ENH must commence repaying the loan to its Concessionaire partners (for the funded/carried interest) and carry costs associated for the development in future.

The Area 4 contract makes provision for ENH to have a participatory interest of only 10% with the remaining 90%[16] allocated to other Concessionaires (ENI Area 4 Contract, 2006:11). In the case of Area 1, the concession allocates a 15% participatory interest to ENH with the balance[17] assigned to other Concessionaires (Anadarko Area 1 Contract, 2006:8).

Findings from the research reveal that participation across the LNG export value chain is dictated by the participatory interest allocated to each party in the concession. As articulated in the literature review (Box 1), the State can obtain a carried/funded participatory interest or cover the full cost of their stake in the development upfront. From the perspective of participating in the value chain, the percentage of participatory interest reflects the proportion of carrying costs, receiving benefits and carrying risks. In practice, a higher participatory interest implies a higher allocation of the profit share, greater control in terms of decisions of target buyers for the gas, greater influence in price negotiations for sale of the gas and other decisions around timing for a ramp up or ramp down of production activities. Findings of the research revealed that the low participatory interest of ENH representing the State in Area 1 and Area 4 contracts (15% & 10% respectively) meant it had minimal influence over activities taking place in the upstream and midstream portions of the value chain.

[16] Mozambique Rovuma Venture (MRV, former Eni East Africa S.p.A, a joint venture owned by Eni S.P.A 35.7%, ExxonMobil 35,7%, CNPC 28,6%) 70%, Kogas 10%, Galp 10 % (Source: INP, 2019).

[17] Total, 26.5% (operator); Mitsui E&P Mozambique Area 1 Limited, 20%; BPRL Ventures Mozambique B.V., 10 %; Beas Rovuma Energy Mozambique Limited, 10%; ONGC Videsh Limited, 10 %; PTTEP Mozambique Area 1 Limited, 8.5 % (Source: INP, 2019).

Role of Greater Participatory Interest

Another finding regarding the relevance of the level of participatory interest relates to how ENH could more rapidly fund its participation share. Interviews revealed that if ENH had been allocated a higher participation percentage in the concession contracts, this could have allowed them to sell a small percentage to raise funding to pay for their stake.

What transpired with the Area 4 concession contracts was that as ENI held an initial stake of 70%, it could sell off multiple portions of its stake to other parties, including Exxon Mobile and China National Petroleum Corporation (CNPC). The research revealed that the Mozambique law limits the participation of the State to no less than 5% and no more than 20% (Law 15 of 2011). Respondent 1 articulated this point stipulating the following:

> *The participation interest is low, it needs to go up to about 30-40% so that we can sell some of it and use the money to pay for our equity. Look at Anadarko and ENI; they have made money without even developing the project - just selling their stakes* (Respondent 1).

5.5 Research Objective 4: Findings on barriers that hinder achievement of greater participation in the natural gas value chain.

This final section provides an analysis and findings of some of the barriers hindering how Mozambique could potentially gain greater participation in the natural gas value chain.

The Financing Conundrum

Responses from the interviews emphasised the importance of financing to obtain greater participation in the value chain. When was asked if Mozambique should look to gaining more access to the upstream part of the value chain – Respondent 7 replied: “do they have the money?” This strikingly straightforward answer spoke to the reality of participating in the upstream part of the oil and gas value chain that financial muscle is a core element of what is required.

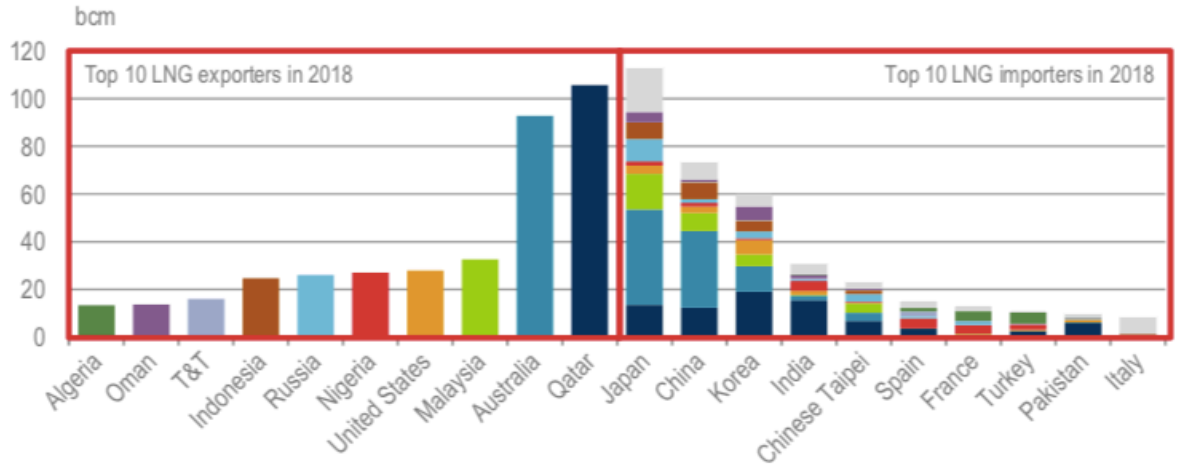
Global financing dynamics significantly influence participation in the natural gas value chain, particularly upstream because of the globally traded and large-scale capital nature of oil and gas projects. The large supply of LNG comes from sources such as Qatar, Russia,

Australia and Nigeria delivered to key demand hubs mostly in Asia and Europe. As illustrated in Figure 5.1 below, the LNG suppliers operate in an international market landscape.

With a finite amount of demand on a global scale, there is a limit to the number of LNG projects the global market can uptake as emphasised by one respondent who stipulated the following.

> *At the end of the day one has to look at demand and supply of LNG globally, by 2020 there could be an oversupply of LNG. Australia has just brought on at least three new LNG facilities, and they cancelled one LNG plant due to demand concerns. The whole development of the Mozambique fields was a race to market with Australia, Tanzania and others – so the world supply of LNG is key* (Respondent 7).

Figure 5.1: Global Trading Landscape for LNG

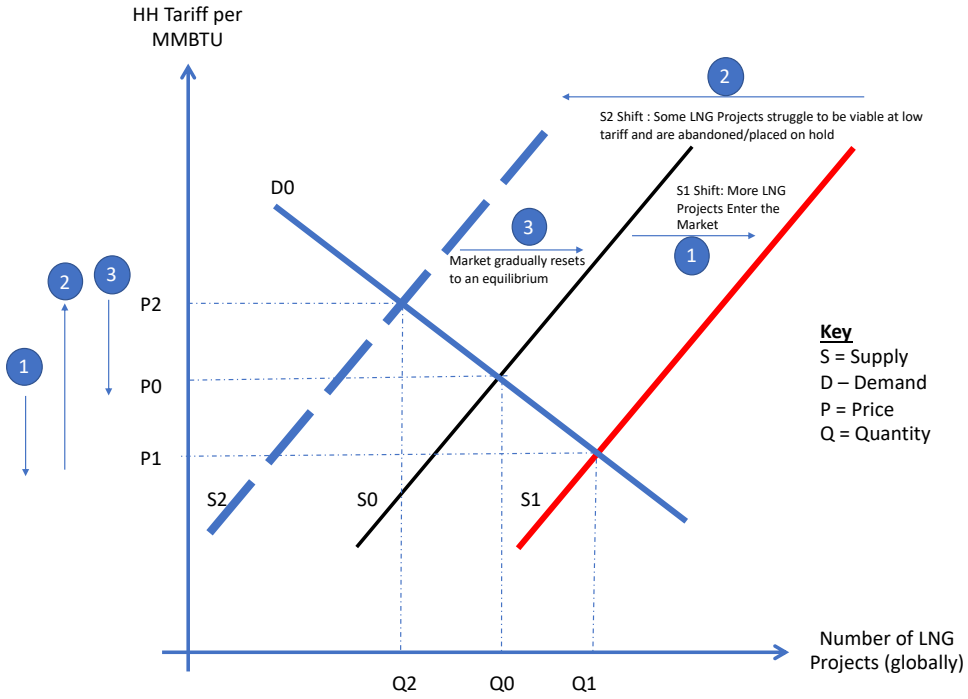


Sources, IEA (2019a)

Analysis from other authors corroborated the findings from the research regarding financing and demand dynamics. As illustrated in Figure 5.2 below, assuming all things are equal (ceteris paribus), the greater the global supply, or supply potential – the lower prices become as suppliers outcompete each other to secure global demand. This results in the abandonment of some LNG projects as smaller facilities struggle to be profitable compared to larger facilities that benefit from economies of scale with the effect of reducing supply and increasing the price.

Equilibrium is ultimately reached at some point between a proportion of abandonment/reduced supply and increased demand and subsequently rising prices (Standard Bank, 2014: 34)

Figure 5.2: Demand and Supply Dynamics for Natural Gas



Source: Author's constructions.

The significance of these economic dynamics lies in how natural gas projects are financed on a global scale. As articulated in the literature review, a project finance approach is typically used for large-scale LNG projects. This method implies that finance is secured off the back of agreements with potential buyers and tied to future cashflows. Given that demand is finite within a given period, there is a limit to the number of projects that can successfully secure finance underpinned by future sales agreements. The movement of the supply curve from S0 to S1 and then to S2, also implies that speed to market is critical. If a State or a supplier misses the window of opportunity to develop an LNG project while appropriate conditions exist to secure sales agreements, given the highly competitive nature of the market this could result in abandonment or halting of the project.

With the increased potential supply of low-cost shale gas from the United States of America into the global market, estimates indicate that supply for LNG is likely to overshoot demand

by 2040 and this has material implications for the ability to secure finance for Mozambique (Exxon Mobile, 2019; Standard Bank, 2014; IEA, 2019a).

Project Finance Dynamics

What then does this mean for Mozambique? As a start, it is important to recognise that there are two key elements to financing oil and gas projects. The first key element, already discussed in the literature review, is the project finance structure which leans on sourcing funding underpinned by potential cashflows from future sales of the proven resource. The financing of natural gas projects is a global contest, the forces of global demand and supply, economies of scale and equilibrium pricing determine whether there is enough offtake in the market at the prevailing price to allow for projects to be financed. The ability to secure offtakes to commence development is thus vital – and cannot be influenced to a large degree through laws or policies set by the State, as free-market economics largely determine this trajectory. In other words, the State may struggle to use legislation for the upstream part of the value chain to gain greater participation. Rather, the dynamics of free global market economics will largely dictate at least the financing portion of this debate. Respondent 5 confirmed this stipulating that "for LNG, the market will always be more efficient at allocating costs, risks and reward".

Upfront Risk Capital Barriers

The second component to financing oil and gas projects is the upfront risk capital required to conduct exploration with no guarantees of finding any resource in the ground. The assertion is that a significant amount of capital is required at risk in order to participate in the upstream part of the value chain to conduct exploration activities. The respondents similarly echoed this perspective.

> *Remember when you do the initial drilling programs you don't know what's there, you only have two- and three-dimensional data, which reflects what the geology is like and you can map it out and draw some conclusions. So you won't know until you drill – and this can come out successful or not – globally you can work-out the success rate of drilling campaigns – it's probably around 20%. The question can be, for the risk private sector takes of say USD 1 billion, what reward do they get?* (Respondent 3).

> *I can tell you a lot of stories about drilling and finding enormous amounts of gas and I can also tell you stories of finding nothing upon nothing upon nothing. Exploration is in many organisations up to USD1 billion to USD 2 billion per year depending on how good their team is and the basins they have been given access* (Respondent 5).

The ability of the State to spend some "at-risk" capital to conduct exploration is thus a significant barrier to entry in the upstream part of the value chain. The majority of the large international oil and gas conglomerates are heavily capitalised with strong balance sheets allowing them to conduct exploration off the back of their balance sheets. Most States do not have this luxury, particularly across the African continent. The reality is that for these multinational oil and gas conglomerates, risk capital typically either comes from equity investors or other capital market sources. A State in the position of Mozambique that recently emerged from civil war and is battling scandals of financial mismanagement would not have either in abundance within the hydrocarbons company ENH (i.e., significant access to capital markets or profits sitting on the balance sheet). A deliberate strategy would be required by Mozambique to actively convert ENH from a typical SOE to a highly commercial company for it to participate substantively in the upstream section of the value chain, given the financial constraints.

Commercialisation Strategies for Natural Gas

Issues of financing aligned with the perspectives of respondents regarding the importance of commercialising the natural gas as a first step. Interviews revealed that the concept of gaining higher value through greater participation was primarily dependent on Mozambique successfully managing to commercialise the mineral resource. Respondents emphasised that without Mozambique managing to produce LNG successfully, there would be no prospect or debate about any value at all. Respondent 5 indicated that:

> *Mozambique must ensure the attempt to get things done better does not derail the effort of getting it done at all*". Respondent 5 went on to articulate that "*an LNG project is one of the most complex to string together.*

If you consider upstream, LNG to plant, port to ship to markets, all this is the most complex to do and nothing that the government does must upset the complexity of pulling this value chain together.

Feedback from respondent 7 also provided similar views where the respondent stipulated that:

*The whole issue with gas is about bringing it to market. In remote areas like Mozambique, they call it stranded gas because there is no domestic market to monetize it, so the best way to monetize it is to export LNG***.**

Respondent 6 also shared similar views indicating: "The LNG export is important because it allows Mozambique to accumulate enough capital to industrialise the country and to actually go about participating in downstream activities".

The respondents further considered the dynamics around why commercialisation was a key prerequisite to any discussion regarding gaining greater value. The critical point made by respondent 5 was that the process of attempting to commercialise the natural gas resource, considering the complexity of the production process, raised issues of who participated in the project, in what proportion and with what responsibilities. Essentially, given the complex nature of commercialising natural gas, there are specific demands in terms of capability and experience that naturally dictate the level and extent of State participation, which are unavoidable if the State wishes to receive any value at all. Respondent 5 articulated the following:

Let's assume operator A finds gas, now they must decide if they can develop it themselves, or if they need partners. Now consider that Mozambique has very limited capability in this space because, by the time the gas is discovered, it's too late to start developing this State capability, as such external partners are required to participate. If you look at the participants in Area 1 & Area 4 concessions, they have been put together into the consortium because they each bring something. Some parties are not big enough to pull it off by themselves; some don't have the technology (Respondent 5).

Technology, Experience and Capability Barriers

Respondent 5 thus emphasised that the debate about participation cannot be isolated from the fundamental technological and experience capability required to commercialise the natural gas for there to be any discussion about gaining greater value. Respondent 6 also echoed this, stating that most national oil companies do not possess the capability. Respondent 6 indicated:

> *National oil companies don't have the technical capability to participate in upstream, they have an equity stake there because they are the vehicle through which the government owns part of upstream activities – this is a global standard – if a country discoveries oil, they need to get something back – and this is through the upstream participation* (Respondent 6*)*.

Considering the concept of domestic gas as a potential vehicle to achieving greater value for Mozambique, respondent 7 mentioned other potential stumbling blocks that needed consideration if this route was to be followed. The core arguments were that commercialisation of natural gas was dependent on there being a captive market. If the gas were for domestic use, there must be adequate demand from industry, residential and commercial applications and a core driver was the need for a burgeoning population. Feedback from respondent 7 indicated the following:

> *Of the 30 million people in Mozambique, roughly 50% is urbanised – so there isn't a huge demand for residential gas. The infrastructure costs are so high, so you need to find anchor consumers in order to be able to make it work, so that's why first and foremost one needs to look at an LNG export facility* (Respondent 7).

Respondent 2 also echoed similar sentiments regarding prospects of supplying domestic gas to the local market as a means of achieving greater value stipulating the following:

> *ENH needs credible off-takers for the domestic gas – this is critical! Currently in Mozambique they don't have credible domestic off-takers that would allow projects to be banked.*

> *We need credible offtakes we can tie down to the investments, and we don't have that here in Mozambique – so we look to South Africa for potential offtakes* (Respondent 2).

If the domestic market is not sufficient to ensure adequate offtake of the natural gas, a regional market would be required, and in the case of the SADC regional market, the biggest offtake would be power generation. To demonstrate the point, respondent 7 articulated the following:

> *If you step out of Mozambique and look regionally, the regional population is also relatively small, and the infrastructure pipeline costs are so high. Once you get a pipeline transmitting gas – you can then get off-takers – but you need a population to support this (*Respondent 7).

The respondents further clarified that the fundamental issues with obtaining a regional offtake for power were heavily dependent on South Africa, and this was also a political issue. Respondents used the stagnated development of the natural gas industry in Namibia due to lack of a domestic market and inability to secure Eskom[18] as an offtake as a prime example. To communicate this point, respondent 7 indicated:

> *Kudu gas in Namibia was discovered in the 1970s, and it still has not been developed – among other reasons, Eskom needed to supply the MOU to offtake the power - but this didn't happen because it would have become competition for Eskom. In addition, Namibia's domestic demand was a small demand – so even with an Independent Power Producer (IPP) in Namibia – the balance of the electricity would have been sold back into the South African grid. The biggest issue was the Namibians didn't have enough demand – so the obvious thing was to generate surplus electricity and sell into the South African grid* (Respondent 7).

[18] Eskom is South Africa's State-owned electricity generation utility

Comparisons with Tanzania indicated that the politics of having Eskom as a major offtake did not affect Tanzania. Respondent 7 indicated the following: "Let's take Tanzania as an example – they have a gas pipeline that feeds Dar es Salaam. Tanzania does not have the same politics of needing to keep Eskom running, so Tanzania has power as the biggest offtake."

The core argument was that it was essential to determine if the South African government wanted Eskom to continue to survive using coal as a key feedstock, or if they were going the IPP route. This was deemed material because power is the biggest offtake for Mozambique domestic gas, and South Africa was the biggest potential customer. Therefore, the discussion concerning acquiring a key power anchor customer for Mozambique's domestic gas must start with a political decision about the survival of Eskom. Respondent 2 also suggested that credible power offtakes were few and far apart in the region, regardless of the demand. The key point made was that demand was only classified as "real" demand if the customer was willing and able to pay for the power, something that has been a struggle for most SADC countries and indeed Mozambique's domestic market over the decades. Feedback from respondent 2 indicated the following:

> *Our people say they need power, so there is demand but if it's not bankable then there is no real demand. To effectively use our domestic gas, we need to look at alternative ways of monetizing our gas - the reality is that people don't pay their electricity bills in time. Even if it makes sense to the politicians to put up power plants in area A, B or C, people won't pay the bills – so do we then subsidize to make it bankable? So, yes, we want industrialisation in Mozambique, but can we bank on it?* (Respondent 2).

Respondent 4 also shared some opinions on the issue of options. The key argument was that South Africa is the most captive market, but South Africa must offer a better deal for Mozambique, one that recognised that Mozambique sought greater participation and to unlock development for its people. Respondent 4 remarked as follows:

> *Northern Mozambique still needs to be developed, similar to the effort that South Africa put in place since 1994 by building roads, clinics, toilets in the remote*

parts of the country –so if you want to get gas from ENH, you need to put these development ideas on the table. South Africa needs to offer something to ENH, for setting up local industries in Mozambique. The reality is that ENH can sell the gas to any other market, but South Africa is the closest market, so we must negotiate – all you need to do is look at the amounts of money we spend to solve problems such as power shortages with Eskom (Respondent 4).

Skills Development and Capacity Building

From a skills and technology perspective, the current experience of Mozambique is that there are weak provisions in the concession contracts for skills transfer. The provisions in Article 14 of the Area 1 contract, as an example, are generally vague with regards to express stipulations for skills development. The contract indicates that "In pursuing Petroleum operations, the Concessionaire shall endeavour, as far as possible, to employ citizens of the Republic of Mozambique who have appropriate qualifications..." (Anadarko Area 1 Contract, 2006:51). The constitution of skills transfer was thus to some extent left to the Concessionaire to determine upon execution (albeit with the consultation and agreement required by the minister on the final proposals).

Interviews with respondents also pointed to the significant issue of skills and capacity building relevant to the debate about how to attain greater value and access to the value chain. Respondent 5, as an example, emphasised the need for the State to a create strong in-house capability that could build options and negotiate with potential investors.

Firstly, for a 3–5 year period – You need to form a joint team of a clean non-corruptible government officials and an international gas consultancy with extensive experience. You need to simultaneously on a non-corrupt basis work on four options – and have the financial muscle to develop all the options and choose between them. This process must be non-corrupt, fully funded and must draw on international experience (Respondent 5*).*

Respondent 6 also made some observations about the need for greater knowledge and technical capability if Mozambique wanted to gain greater access to other parts of the value chain. Respondent 6 remarked that:

> *Over the years ENH has sent people to leading oil and gas companies such as Anadarko and ENI to get a better understanding but I don't know if ENH will set up an entire division just to focus on technical skills capacity building to either know enough to start making inroads in upstream – or if they are comfortable to know enough to just play in the downstream* (Respondent 6*).*

Respondent 5 also emphasised the importance of technical and negotiating capability not only for purposes of gaining greater value, but for gaining any value at all.

> *For all these options, there are counterparts – so Mozambique also needs a negotiating team. Unfortunately, it usually comes down to meetings with the minister at bars at night, but this is not what it should come down to. Mozambique needs to have negotiators who can deal with potential gas buyers or power plant developers. Mozambique needs to develop gas utilization options and negotiate in parallel – If they don't – they will be taken to the cleaners because they will have no fall-back options. Unfortunately, typically neither the capability, time nor options are invested – so it usually comes down to the minster – but he has no developed options to choose from* (Respondent 5).

5.6 Conclusions

In terms of participation in the value chain, it can be concluded that it may be difficult for Mozambique and indeed other oil and gas producing nations to legislate their way into the upstream part of the oil and sector. This difficulty can be attributed to the global nature of the financial system that underpins this participation and high barriers to entry in the form of large multinationals that possess the risk capital to execute exploration activities at scale, while typical African SOEs do not possess this capability.

However, the conclusion is that States can potentially legislate their way into the downstream part of the value chain with less complexity. The key difference here is that of the two financial requirements (upfront risk capital and project finance capital), downstream activities to a greater degree only require the latter because the upstream part of the value chain bears the majority of the initial risk (development risk).

Of course, normal technical and other project risks may still occur as with any project at either stage, but the barrier to entry ceases to be the availability of risk capital, and as such, legislation can be an effective tool to gain greater access or create the conditions required.

Another conclusion based on the findings is that greater benefit for participation in the value chain for States could be more expediently extracted (at least in the early stages of discovery) by not taking on the challenge in the parts of the value chain where SOEs face very high barriers to entry and have little influence to change the outcome (i.e., upstream).
The SOEs are perhaps better placed to exert significant effort in the downstream part of the value chain where there are lower barriers to entry, and they can more effectively utilise State tools such as legislation to enter this market without deterring investment through aggressive policies such as nationalisation. As already communicated, the multiplier effect of downstream activities is the greatest.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This dissertation aimed to investigate whether Mozambique could achieve greater participation from its mineral resources value chain. A case study methodology was utilised based on qualitative research design to investigate the historical participation of Mozambique in its natural gas value chain, capacity demands, legislative frameworks in place to aid greater participation, provisions of select concession contracts and barriers to achieving greater participation. The following chapter now sets out the conclusions and recommendations that have emanated from this research.

6.2 Conclusion and Recommendations

The conclusions and recommendations have been set out in accordance with the research objectives. The intention is for them to be utilised in Mozambique, or to be transposed to other mineral rich African countries seeking to gain greater participation in their value chains in order to attain greater benefit for the masses.

Research Objective 1: To understand the history of Mozambique's participation in its natural gas value chain.

The research conducted revealed that when Mozambique discovered the first natural gas in the Pande-Temane fields, it did not secure adequate participation in the downstream activities. There were no provisions for domestic gas in the project, and as a result, the research showed that the possible multiplier effect of an increase in GDP that Mozambique should have received was not attained when compared to other countries, for example, Qatar through the utilisation of domestic gas. This conclusion is supported by World Bank (2003) who articulate that Mozambique did not fully receive its fiscal benefits from the project due to the structure of the Pande-Temane project, which had skewed benefit towards the private investor. It can thus be concluded that with the first natural gas project, Mozambique did not receive full benefit from the natural gas resource due to inadequate participation in the value chain, a result which the research has attributed to a lack of preparedness in terms of negotiating capability and not having the appropriate laws in place.

Further to these conclusions, it is recommended that any effort to prepare countries that have or are about to discover natural resources would be beneficial. This would create a certain level of "operational readiness" to be able to receive the legal, technical, financial and political realities that come with the development of large-scale, billion-dollar Mega-Projects. Standard Bank (2014) refers to this as the need for countries to "invest in investing" by developing the required capability to adequately appraise projects that may be possible in the future due to increased revenues (Standard Bank 2014: 45).

Research Objective 2: To determine the legislative frameworks that were in place to help Mozambique achieve greater participation from its natural gas value chain

The research concluded that legislative frameworks to support greater participation in the value chain were not adequately in place prior to signing of the Pande-Temane, Area 1, or Area 4 concession contracts. Laws expressly making provision for domestic gas as an example (which is a mechanism to increase participation in the downstream part of the value chain) were only enacted in 2014, whereas concessions for Pande-Temane, Area 1 and Area 4 blocks were concluded in 2000, and 2006 respectively. In addition, the research concluded that the legislative framework in Mozambique lacked adequate specificity regarding issues such as mechanics of how the State spreads itself across the value chain beyond mere specification of the participatory interest, as well as provisions of how the State could embed itself as a participant in the value chain through technology transfer and skills development. It was also concluded that the ability of Mozambique to legislate its way into the upstream part of the value chain could be difficult due to the global financing dynamics that significantly influence this section of the value chain. To this end, securing offtake agreements to attract finance in the upstream part of the value chain is vital if the project is to proceed. This conclusion is supported by the IEA which articulates that "For a liquid natural gas liquefaction plant to obtain a Final Investment Decision (FID), binding long-term contracts covering most of the output (85% on average between 2009-16) have been required as a commercial guarantee to finance the investment" (IEA, 2019a:15).

Noting the above conclusions, it is recommended that States put in place the required legislative frameworks prior to engagement of private investors in concession contracts. This accordingly requires investment in the development of skills and knowledge in the natural gas sector in anticipation of the development of the projects. Given the noted complexity of Mozambique legislating its way into the value chain, from a legislation perspective, It is also further recommended that Mozambique is perhaps better placed to exert significant effort in the downstream part of the value chain which has lower barriers to entry where the country can effectively utilise State tools such as legislation to make inroads into this market without deterring investment through aggressive policies such as nationalisation.

Research Objective 3: To determine contract provisions relevant to participation in the value chain

From a contractual perspective the research concluded that the quality of participatory interest provisions of the concession contracts have a pivotal role to play in determining the level of influence and control that the State can yield in the project in order to achieve greater benefit. The research also revealed that the Mozambique did not have sufficient participatory interest in the concessions to wield noteworthy control and decision-making power in the upstream and midstream parts of the value chain.

Considering the above conclusions, it is recommended that consideration must be given for the ability of States to make decisions that will promote the availability of gas in the downstream part of the value chain. This can be done through ensuring adequate participatory interest in the concession contracts which can aid the level of influence (not control) in the upstream part through the concession contracts. Yes, multinationals can take on the upstream exploration and development risk in the early discoveries because they are better placed to manage it, given their experience and financial resources, however, some influence must be retained by the State through the provisions in the concession contracts even in the upstream part to avoid later downstream efforts being scuffled (at least in the early stages of the discoveries).

Research Objective 4: To determine barriers that hinder achievement of greater participation in the natural gas value chain

It can be concluded from this analysis that greater participation in the value chain is required to increase benefits to the State. The analysis provided indicates that given the barriers to entry in the upstream part of the value chain such as upfront risk capital and advanced technology capability demands, the most suitable entry point for Mozambique (and perhaps the other African States) is to start by focusing on accessing the downstream part of the value chain, specifically the domestic gas component. This downstream section of the value chain presents the best mechanism to unlock economic potential through multiplier effects of industrialisation and growth (beyond the collection of taxes and royalty revenue by the State). The domestic gas as a mechanism for entry is also well suited to the tools available to the State, principally legislation to secure supply of domestic gas from Concessionaires and economic policy which encourages the use of domestic gas as the main energy source that is part of the energy mix. The potential accessibility of the downstream part of the value chain through domestic gas thus potentially holds greater prospects, compared to the upstream (exploration) part which is heavily restricted by technology demands and global financial market dynamics (at least in the early years of natural resource discovery). Standard Bank (2014) also supports this conclusion stating that one of the ways to obtain greater value from the extractive resources such as natural gas in addition to revenue from taxes and gas sales, is through stimulating economic activity. This can be done they argue "through building local industry off the back of domestic gas made available to Mozambique" (Standard Bank 2014: 44).

Considering the above conclusions, a key recommendation to achieving greater participation is a progressive approach with initially limited participation in strategic parts of the value chain to unlock industrialisation, economic activity and much-needed revenue. Revenue generated from these activities can then be utilised to gain greater participation in other parts of the value chain. Greater participation across the entire value chain cannot be legislated. Although legislation can assist, particularly in the downstream part, real success is a function of the host country's ability to acquire technology and skills, attract financial capital required to lead a gas development campaign and experience with operations of gas fields.

Mozambique could take advantage in future broader participation in upstream activities once they complete the fifth licensing/tendering round and if gas is found in this phase. Revenue as well as industrial and economic benefits from the first 4-8 trains of LNG planned from Area 1 and Area 4 could thus be leveraged to achieve this reality.

Indeed, greater participation is about building capacity and capability within a specific time horizon, guided by a particular strategy. It may be that this dissertation is of limited assistance to the gas sector in Mozambique if no new gas is found in the fifth licensing/tendering round. However, for other countries such as South Africa who only recently started exploration in 2019 through Total, the fundamental knowledge can be applied with significant and widespread impact, and perhaps also transposed with some adaptation to other mineral-rich nations (not necessarily natural gas).

6.3 Areas for Future Study

An area for future study could be further analysis of which policies and frameworks could be established to allow each of the constituent parts of the host country being the State, local private sector and local communities to gain greater participation. This research could include a critical analysis of indigenisation policies, policies allowing local communities to have shareholdings in natural gas projects (similar to policies in the mining sector) and well-defined policies of how the government can create a conducive environment to allow for more Mozambicans to participate in the natural gas value chain.

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ANNEXURE

RESEARCH INSTRUMENT
INTERVIEW REQUEST LETTER

Dear Sir/Madam,

My name is Kudzanayi Bangure. I am conducting some research under the University of Cape Town, Faculty of Commerce: Nelson Mandela School of Governance.

My research topic is “an analysis of whether Mozambique can gain greater participation in the natural gas value chain” and I have further chosen Mozambique as my case study.

The research seeks to interrogate the fundamental rules, power dynamics, and nuances of appropriate conditions that govern the participation of African States within mineral resources value chains. The research seeks to answer the question that seems to continue to elude African countries regarding how to substantively participate in these value chains.

The objective is to identify how African countries, specifically Mozambique can better participate in mineral resources value chains to chart a roadmap towards increased local benefit from African natural mineral resources.

I would like to discuss the aforementioned topic with you via a telephonic/skype interview. You will not be requested to supply any identifiable information, ensuring anonymity of your responses. This research has also been approved by the Commerce Faculty Ethics in Research Committee of the University of Cape Town.

Please advise if I can schedule some time with you in the following 2 weeks for a brief interview.

Below is the semi-structured interview guide.

Regards,
Kudzanayi

RESEARCH INSTRUMENT
SEMI-STRUCTURED QUESTIONNAIRE GUIDE

Research Objective 1: To understand the history of Mozambique's participation its natural gas value chain.

- What natural gas projects have been executed in Mozambique?
- What is your view on how Pande-Temane project was rolled out?
- Did they give the gas away too cheap?
- What could Mozambique do differently to what was done historically in order to achieve better participation in their natural gas value chain?
- What can Mozambique do not to squander the Area 1 & 4 opportunity?

Research Objective 2: To determine the legislative frameworks that are in place to help Mozambique achieve greater participation from its natural gas value chain.

- What legislative frameworks are in place to underpin how Mozambique can achieve greater participation from the natural gas value chain?
- How can legislation play a greater role in achieving greater participation for Mozambique in the natural gas value chain?
- Is the legislation sufficient to achieve greater participation?

Research Objective 3: To determine concession contract provisions relevant to participation in the value chain.

- Which provisions have been used in the concession contracts to achieve greater participation in the natural value chain?
- Is technology transfer possible and can this be done through the contracts?
- What advise can be given to the government about structure and execution of concession contracts to achieve greater participation?
- Should Mozambique focus on upstream given where they are now?
- Is it wishful thinking that Mozambique can participate upstream at this stage?

Research Objective 4: To determine key inputs and entry points for achieving greater participation in the natural gas value chain.

- What are the barriers that could hinder Mozambique from gaining greater benefit from its natural gas value chain?
- How can Mozambique overcome the hurdle of large-scale capital required for a State led natural gas industry development campaign?
- What is your take of the realities associated with financing required for exploration – on balance sheet or off-balance sheet?

- What are some of your thoughts on how Mozambique can get best value for their gas?
- In your view what is the role of the market in assisting the Government of Mozambique to get better outcomes?
- Does the market have a role in that sense at all? Or its limited to efficient extraction commercialization and distribution?
- How have other actors (or countries) managed to achieve better participation in the natural gas value chain and under what conditions has this been achieved?
- What can Mozambique do to reach where the likes of Saudi Aramco are in terms of capability?

-END